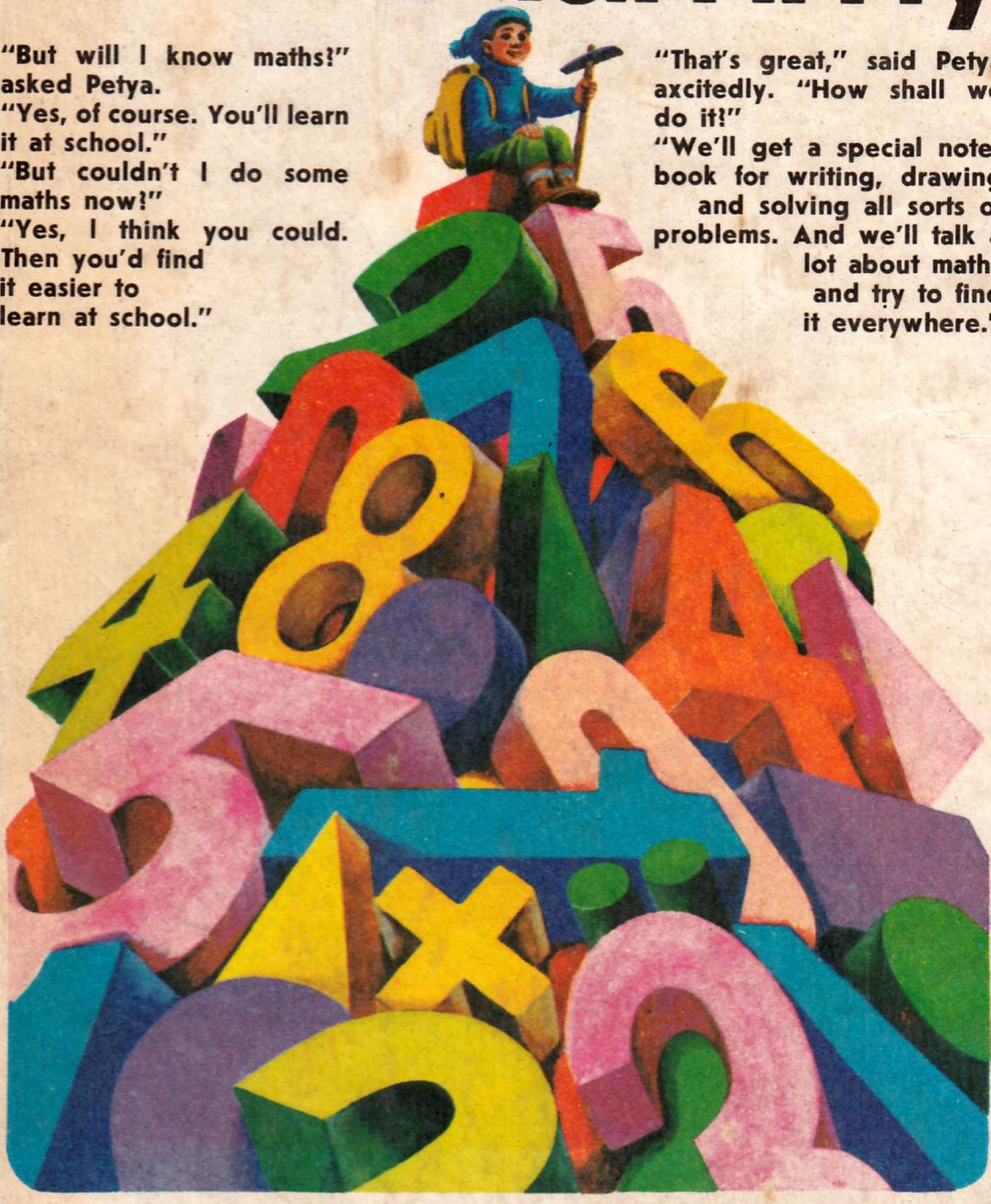
Maths with Mummy

V. Zhitomirsky
L. Shevrin

"But will I know maths!" asked Petya.
"Yes, of course. You'll learn it at school."
"But couldn't I do some maths now!"
"Yes, I think you could. Then you'd find it easier to learn at school."

"That's great," said Petya excitedly. "How shall we do it!"
"We'll get a special notebook for writing, drawing and solving all sorts of problems. And we'll talk a lot about maths and try to find it everywhere."






55
45
375
50
4
7
52
375
144
2×2=4

Maths with Mummy

V. Zhitomirsky
L. Shevrin

Translated by **Diana Miller**

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Edited by *Katherine Hamilton*
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В. ЖИТОМИРСКИЙ, Л. ШЕВРИН

Математическая азбука

На английском языке

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FOREWORD

Maths with Mummy introduces young children to mathematics. What should a child learn during this first introduction? Obviously this basic information must include numbers from one to ten, simple mathematical operations using them, and the main geometrical figures. At the same time the modern approach to teaching mathematics is in favour of extending the range of this traditional information to include new concepts such as multitude, relationship (including comparing numbers of different magnitude) and the unknown. We also believe that this initial stage should teach children to distinguish and classify objects according to different characteristics and to add up these combinations when necessary. Children should also learn to develop simple measurement skills.

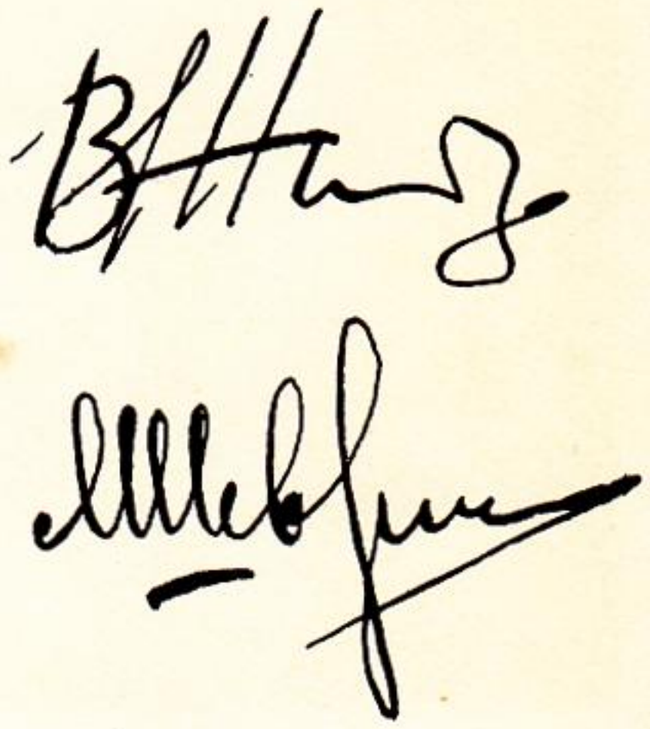
The authors took all this into account in writing the *Maths with Mummy*. With regard to the form of the book, the authors proceeded from the assumption that the material at this early stage must be as interesting as possible. The book has been written in the form of a story about an ordinary family, so the child absorbs the rudiments of mathematics not in special lessons, but in real situations together with the main characters, Petya and his little sister Olya. The many colour illustrations and cartoons about Lyapa the Donkey also help to arouse children's interest and hold their attention.

Another feature of the book must be mentioned. Unlike ordinary school textbooks which can be used only with the direct participation of a trained teacher, this book has been planned and written so that the necessary explanations, commentaries and discussions are contained in the text itself. This means that any adult using the book to teach children does not need to prepare the material in advance or worry about how to present it. We believe that the book will enable children to absorb the basic minimum of mathematical knowledge irrespective of where they are taught and the degree to which the parents or teacher are familiar with mathematics and teaching methodology. We have included British measures as well as the metric system for the convenience of the English-speaking countries.

The book is intended primarily for use at home with children of five and six. It can also be used as a textbook with the older groups at pre-school establishments and for home reading in primary schools. It is so designed that it can simply be read aloud, but naturally it is to be hoped that adults will play a more active part, supplementing it with their own explanations, questions and as much discussion as possible.

The text is divided into ten parts which we have decided to call notebooks. Each notebook is self-contained, consisting of a separate mathematical subject and episode in the story. This does not mean, that it must be covered in one lesson. Children should not be given too much new information. In most cases the text of each notebook can be split up into smaller sections.

The questions and tasks for the child and the exercises are most important. They will help the child to absorb the mathematical content of the book and acquire certain practical skills more consciously and effectively. The child must answer all the questions and do all the tasks that are set. With regard to the exercises, some of these may be omitted, particularly as they include some fairly advanced ones. Adults should decide themselves which exercises to set depending on a child's individual ability. The same applies to writing down numbers and mathematical formulae. Do not insist that children should write them down, particularly if it is likely to affect their attitude towards learning maths. We should be grateful for any information as to how this book has been used, with what age group, over what period and with what results. We should also be glad to receive any comments and suggestions for improving it.



HOW IT ALL BEGAN



Petya has made up his mind. He is going to learn maths. This is how it began.

Mummy was cooking dinner. Petya was playing with his cars and lorries. He loaded up a lorry with building blocks. He was going to build a big, big house.

Then Petya's little sister Olya ran into the room. Olya upset the lorry. She didn't mean to, of course. But there were blocks all over the floor. Petya pushed Olya and Olya burst into tears. Then Mummy came in.

"Stop that noise, children," she said. "Olya, leave Petya alone. Go and find something to play with. Petya, don't be cross with your sister. She's only little. Why don't you come and help me? Go and fetch me some potatoes."

"How many?" asked Petya.

"Seven," said Mummy.

Petya went to the potato bag and began to count.

"One, two, three, four, five." That was all he could hold. He took them to Mummy in the kitchen.

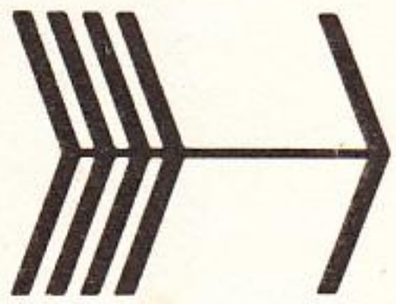
"But, Petya," she said, "you've only got five. You must fetch two more."

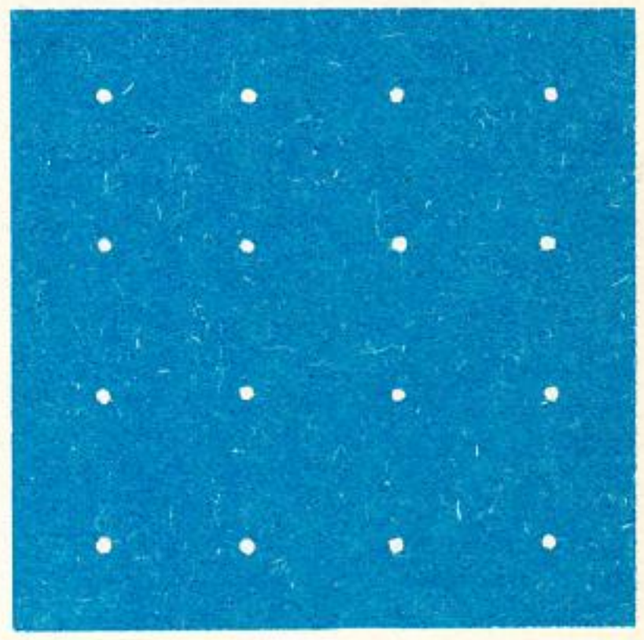
"Two?" said Petya.

"Yes, two," said Mummy. "I asked you for seven. Two and five make seven."

"How d'you know that?" asked Petya.







"Because I know maths," said Mummy.

"Shall I know maths?" asked Petya.

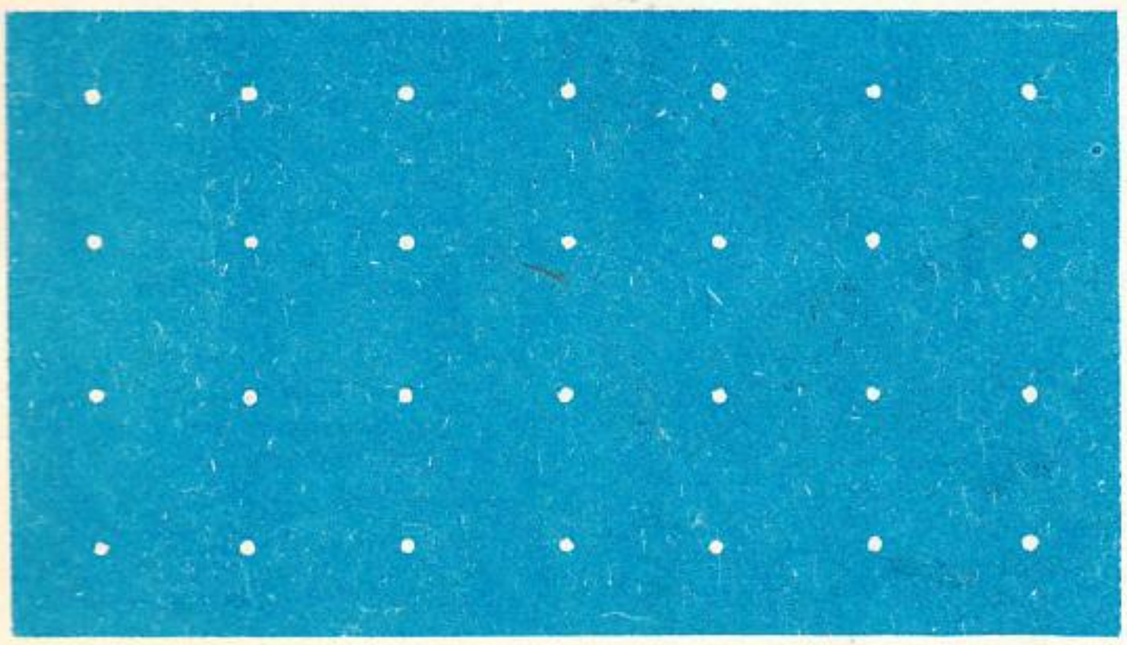
"Yes, when you're big. You'll learn it when you go to school," said Mummy.

"That's good," thought Petya. "Then I shall be able to count all my bricks. And I shall know how many I need to build a house."

He fetched two more potatoes. Then he went back to load his lorry again.

That evening Daddy was helping Petya make a crane. Daddy had bought him a kit. Petya passed Daddy the pieces and Daddy put them together.

"Pass me the square piece, Petya," Daddy said. "Then I can screw it to these two planks."



Petya passed him a piece.

"Not that one," Daddy said. "The square one. Look, this one is square. You'll have to learn some maths."

"Maths?" said Petya. "Why maths?"

"You'll learn about shapes in maths," Daddy said.

"But Mummy told me maths was about counting," said Petya in surprise.

"Mummy's quite right, Petya," said Daddy. "Maths is about counting. And about shapes. And lots of other things too. You'll find out all about it when you go to school."

"But, Daddy, that won't be for ages. I want to know now. Why can't I learn now?"

Daddy thought for a minute. Then he said, "Well, you're quite a big boy. You're already six. I don't see why you shouldn't learn a little now. In any case, it'll help you when you go to school."

"Good," said Petya. "Can we start now?"

"Yes," said Daddy. "I'll give you a special notebook to write and draw in. We'll do all sorts of different problems. We'll talk about maths and we'll try to find out as much about it as we can."

"Will Mummy do it too?"

"Of course. We'll never manage without her help."

"Can we start immediately!" asked Petya.

"Why not!"

They sat down together at the table and Daddy gave Petya some pencils and a notebook.

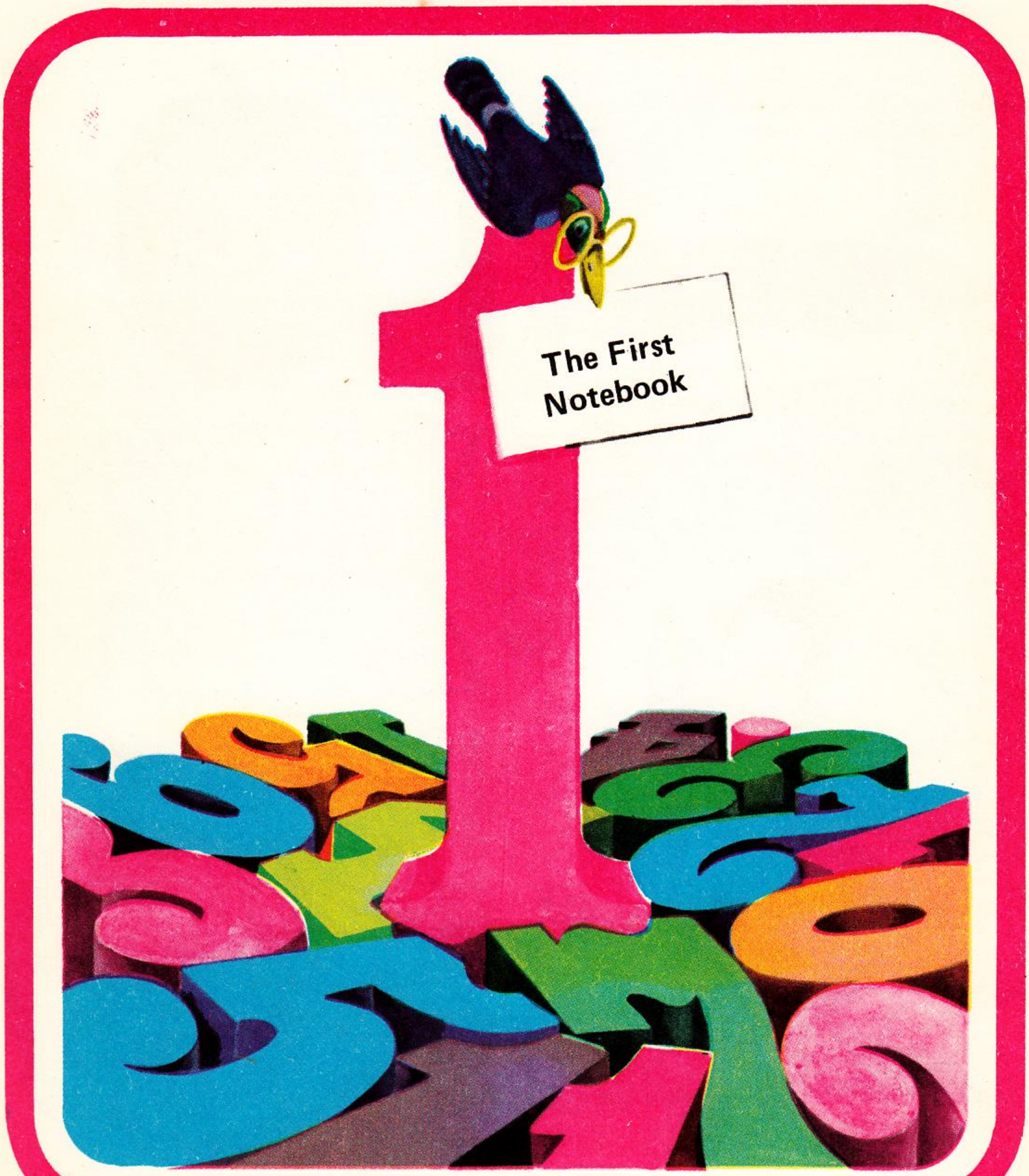
Presently, Olya ran up.

"I want to draw too," she cried.

"I'm not drawing. I'm doing maths," said Petya importantly. "You're only four. You're too young."

"Don't be nasty, Petya. Let her stay. Here you are, darling, a pencil and paper. You can sit and draw with us as well. Now, Petya, open your *First Notebook*."




The First
Notebook

"We'll begin at the beginning," Daddy said. "The very first number is one. Even Olya knows that. Come on, Olya. How many pencils have you got in your hand?"

Olya showed them her red pencil.



"No, don't show it. Tell us how many."

"One," said Olya.

"That's right. And how many dolls are there on the sofa?"



"One."

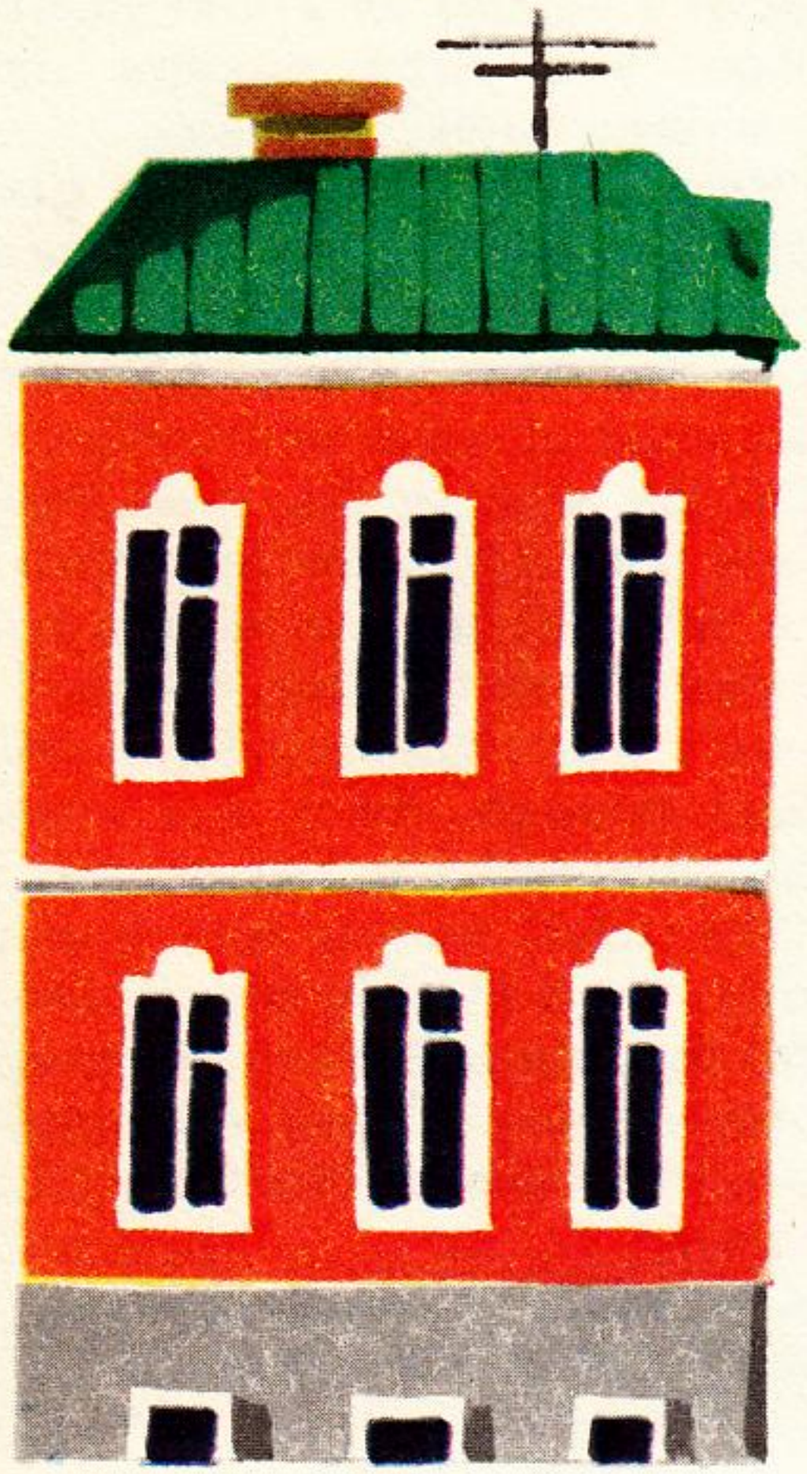
"And how many apples on the plate?"

"One," Olya said again.

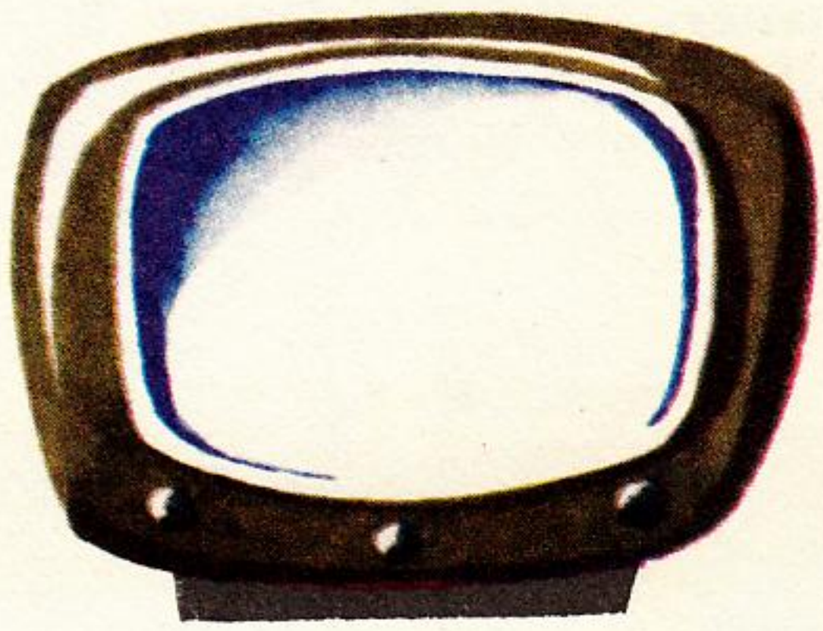


Name correctly:

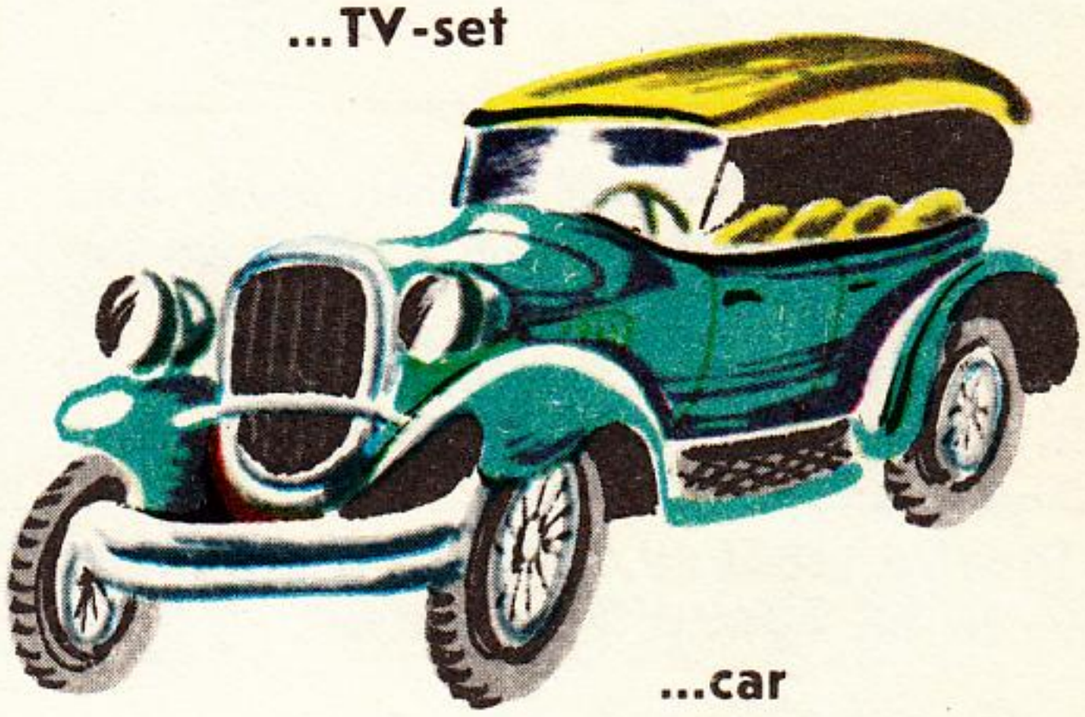
Now look around your house and name everything that there is only one of.



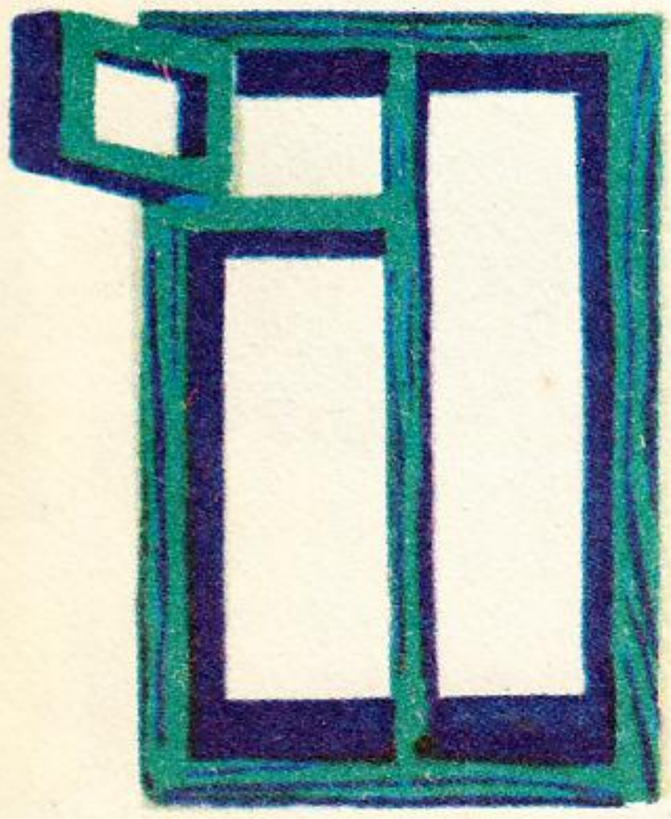
one house



...TV-set



...car



...window



...cat



...dress



...airplane

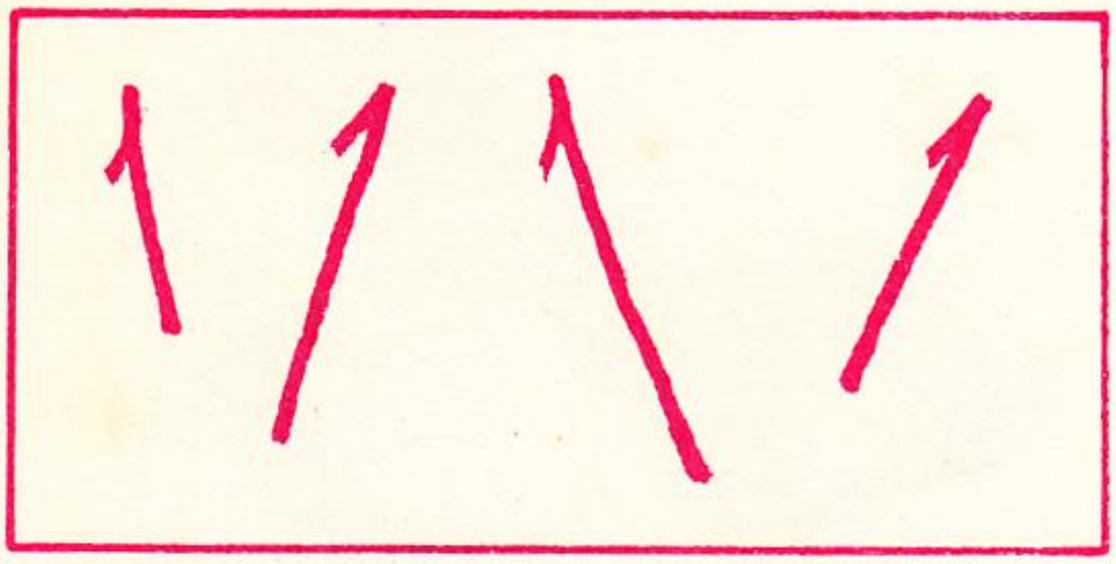
"What'll I write down in my notebook, Daddy?" asked Petya.

"Numbers. We use letters to make words, but numbers are written with signs called numerals. Here's number 1."



Petya busied himself writing ones. And Olya started drawing them as well on her sheet of paper. Of course, hers were all different sizes. Some leaned forwards and some leaned backwards. Here are some of Olya's ones.

"They're crooked," she said laughing. "They're all bendy, like worms!"



When Petya saw them he laughed as well.

Then Mummy came in.

"What's going on!" she asked.

"We're doing maths," Petya cried. "Daddy's telling us about numbers. This is how you write number one. Look, I'm writing ones."

"How clever you are! I'm glad you've decided to learn maths. But I've got a job for you now. Only it's maths too, in a way. Go to the shop with Daddy and buy me one pound of sugar and one pint of milk."

On the way to the shop Petya asked Daddy if he'd brought any money. Daddy took some coins out of his pocket and showed them to him. "Look," he said, "there's a number on these coins."

Sure enough, there was a one on the small coin and another on the big coin.

"The small one is one kopeck," said Daddy, "and the big one is one rouble."

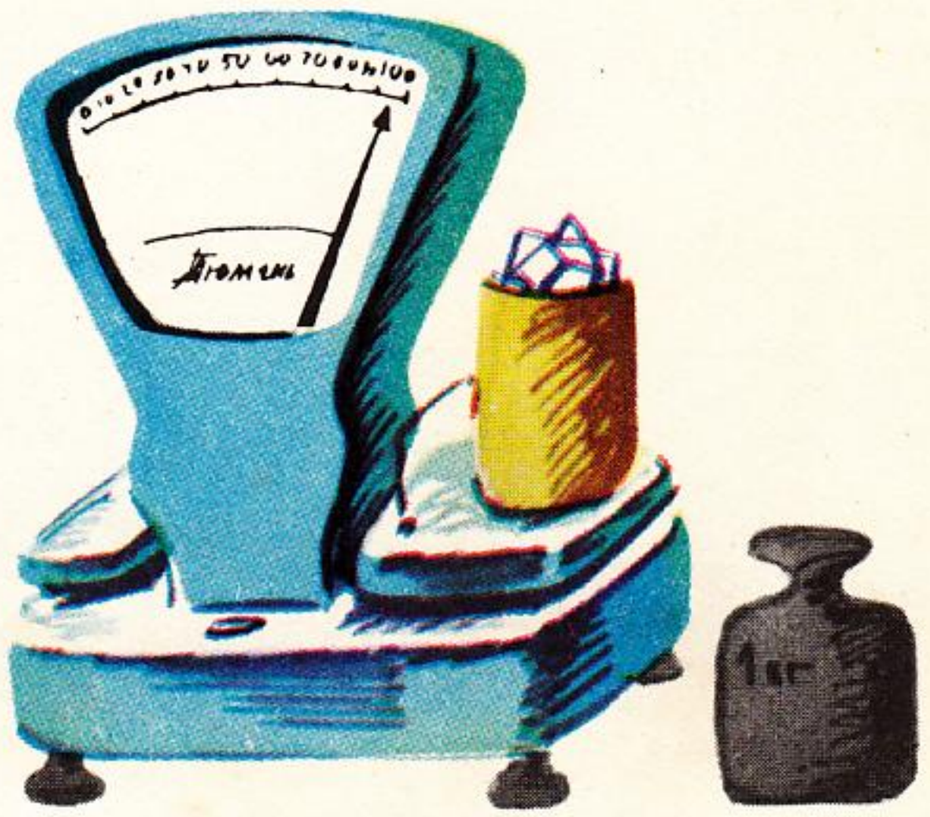
In the shop Petya went up to the counter. "May I have one pint of milk, please!" he asked. The salesgirl gave him a carton.



Then they went up to another counter and asked for one pound of sugar.

There were some weights on the counter, by the scales. Daddy showed Petya a one-pound weight.





1 pint

On the way home Petya noticed a bus at the bus-stop.

"Look, Daddy, there's one again!" he cried. "One bus!"

"Yes," agreed Daddy, "there is one bus. But the number on it is the number of the route."

"What's a route!" asked Petya.

"Different buses go in different directions," Daddy explained. "The directions are called routes, and they all have numbers. This bus goes along route number one. It's a number one bus."

"Are there number one trams too!"

"Of course there are. A lot of things have number one. For instance, the first house on a street is number one. And so



is the first flat in a house. And then there's the first day of the week and the first month of the year."

Do you know what
the first day
of the week is!
And the first month
of the year?

At home Petya proudly showed Mummy the things they've bought:

"One pound of sugar, one pint of milk... Now I know what one kopeck and one rouble are."

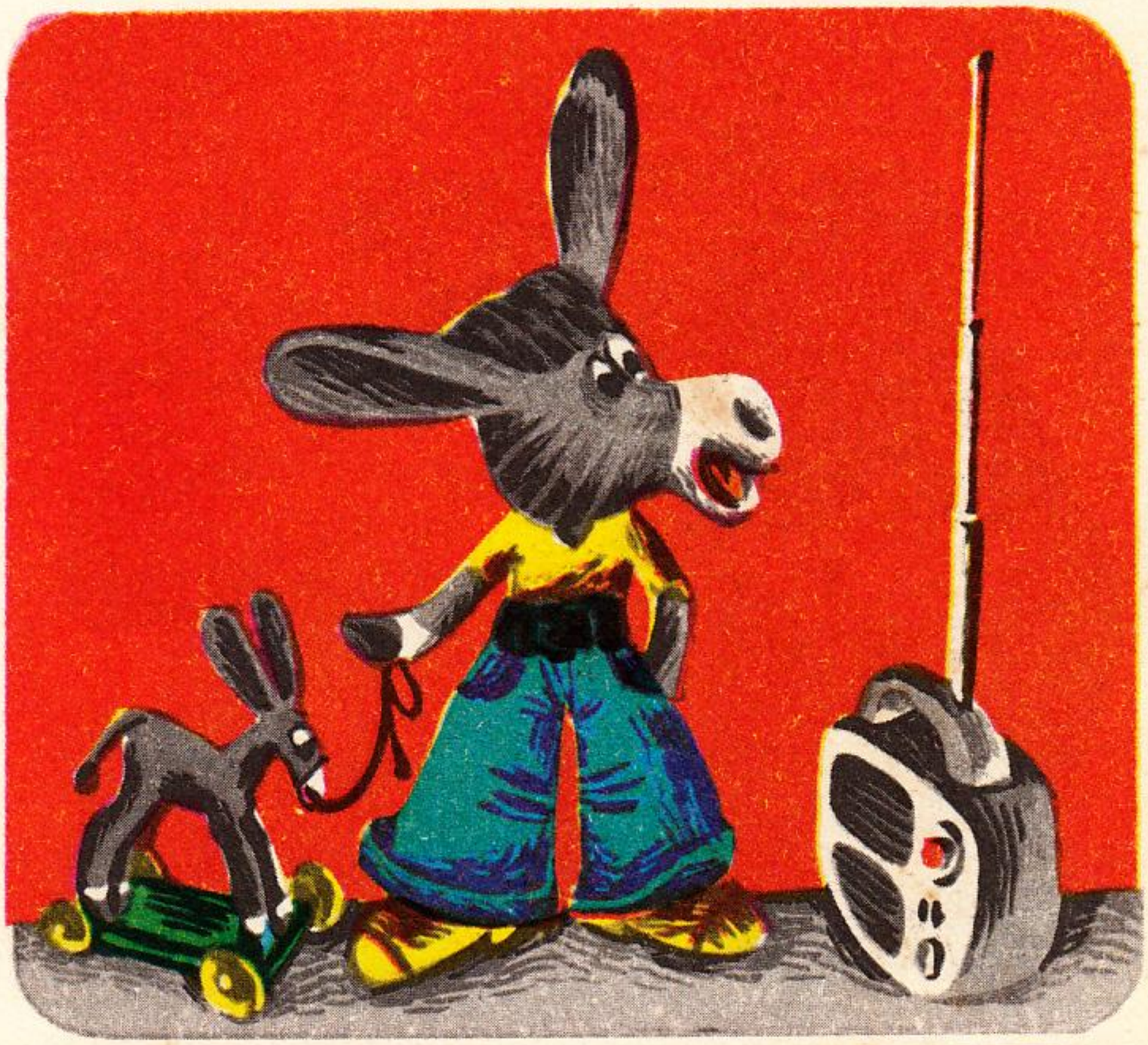
"Very good," said Mummy. "Your first lesson in maths was very successful."

"What shall we do now!" asked Olya.

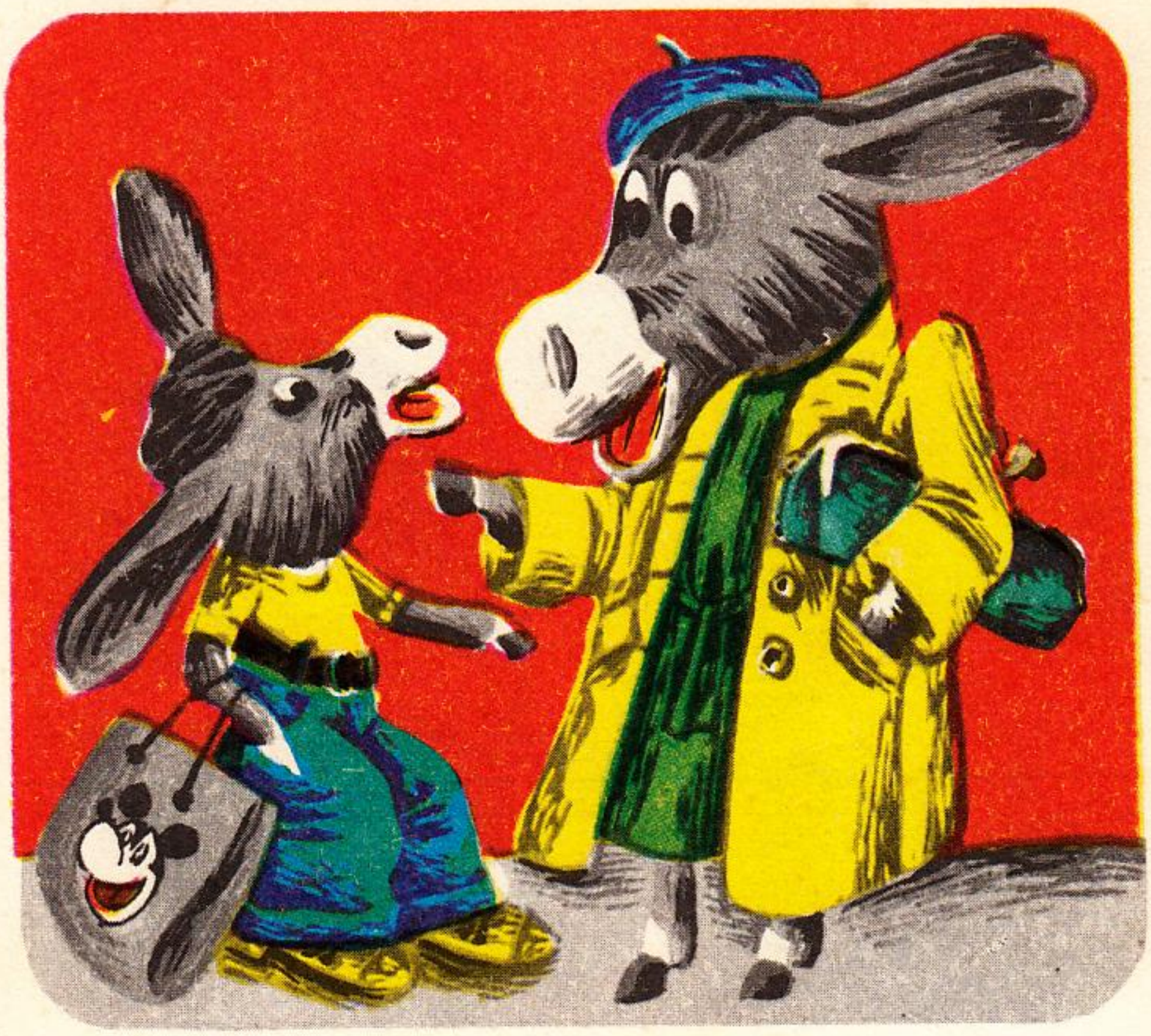
"Let's watch a cartoon. About Lyapa the Donkey," Daddy suggested.



HOW LYAPA THE DONKEY WENT TO MARKET



This is Lyapa the donkey. He thinks he's grown-up and very clever.



LYAPA: I'd like to go to market, Mummy, and buy some hay.

MUMMY: You're too little to go by yourself. You can't read, and you're bad at counting.

LYAPA: I can count. I can count up to one. And I can read number one, and write it, too.

MUMMY: All right, then, go. We'll see what happens.



LYAPA: Excuse me, sir. I'm trying to find my way to market. Can you tell me where to go?

BEAR: Take a number five bus and get off at the last stop.

LYAPA: Excuse me, can you tell me where I can buy some hay?

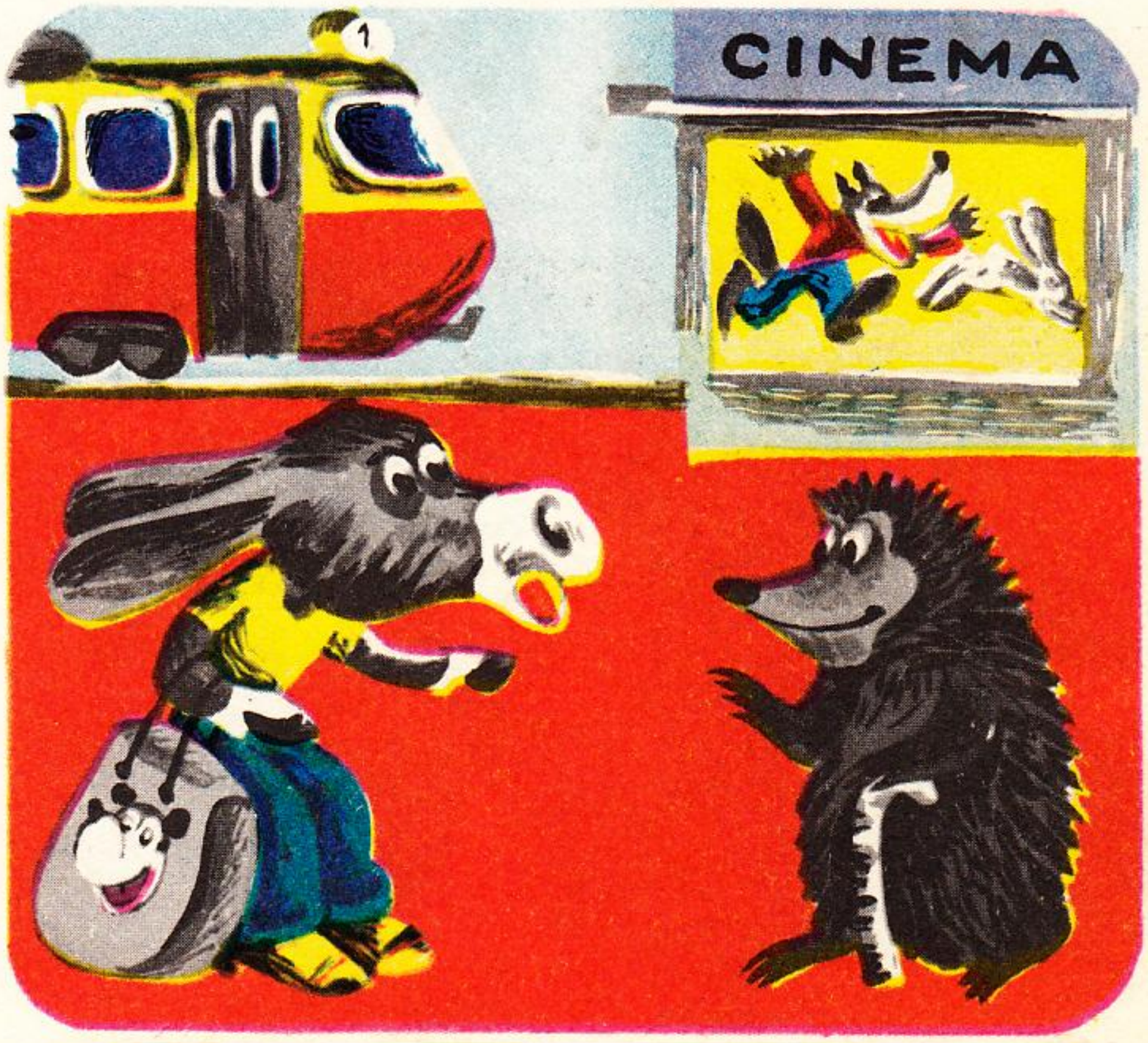
HEDGEHOG: You can't buy hay here. This is a cinema.

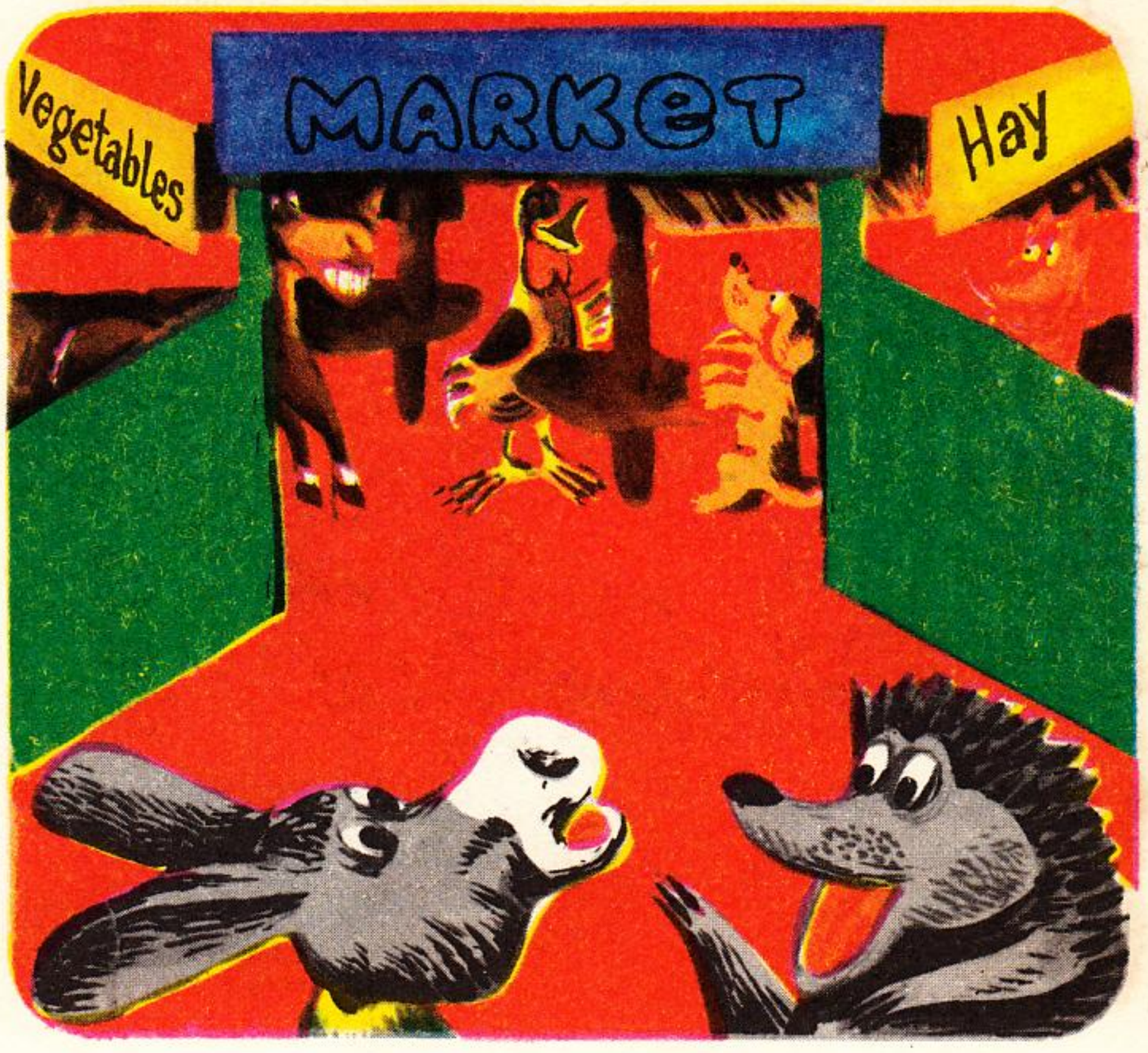
LYAPA: But Bear told me that the market was at the last stop.

HEDGEHOG: Yes, but he also told you, no doubt, to take a number five bus. You've taken the number one tram.

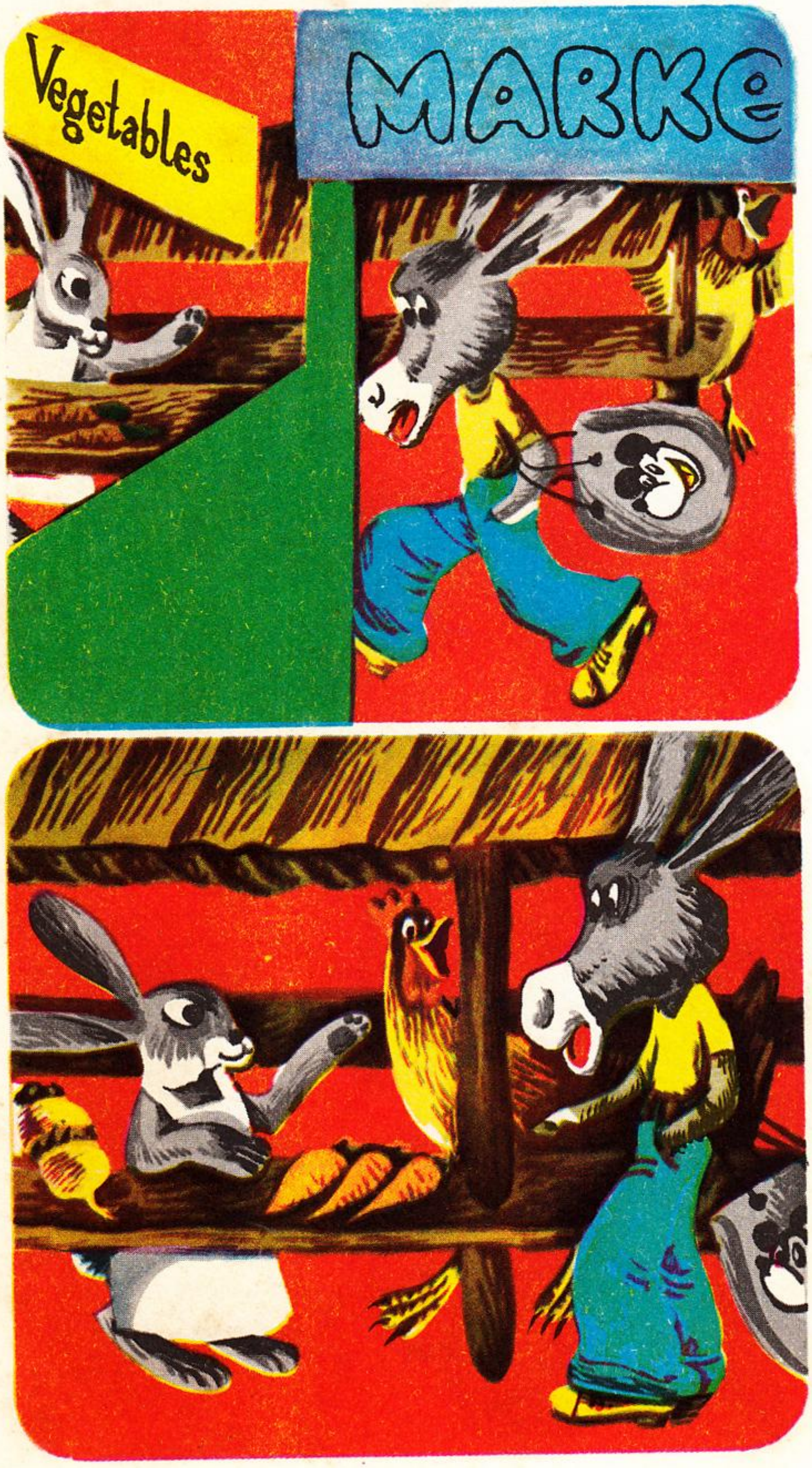
LYAPA: I can only count up to one.

HEDGEHOG: Oh, you silly little donkey! You've got everything all mixed up! I shall show you where to go.





Here we are! This is the market. Be careful. Try not to get things all mixed up in future. You'll find them selling hay on the right of the entrance.



LYAPA: May I have some hay, please?

HARE: We don't sell hay. We sell vegetables. The hay is on the other side.

LYAPA: Why did Hedgehog say they sell hay on the right of the entrance?

HARE: He was quite right. They do sell hay there. But you should have turned right, and you turned left instead. You silly little donkey! You've got everything all mixed up. You'd better buy a carrot from my stall.



LYAPA: OK. Give me one pound of carrots.

HARE: Have you got any money?

LYAPA: Of course I have. Here you are: — one pound, please.

HARE: But that's only one kopeck! You're still getting everything muddled, little donkey. Never mind, have it on me. Only don't forget to wash it.

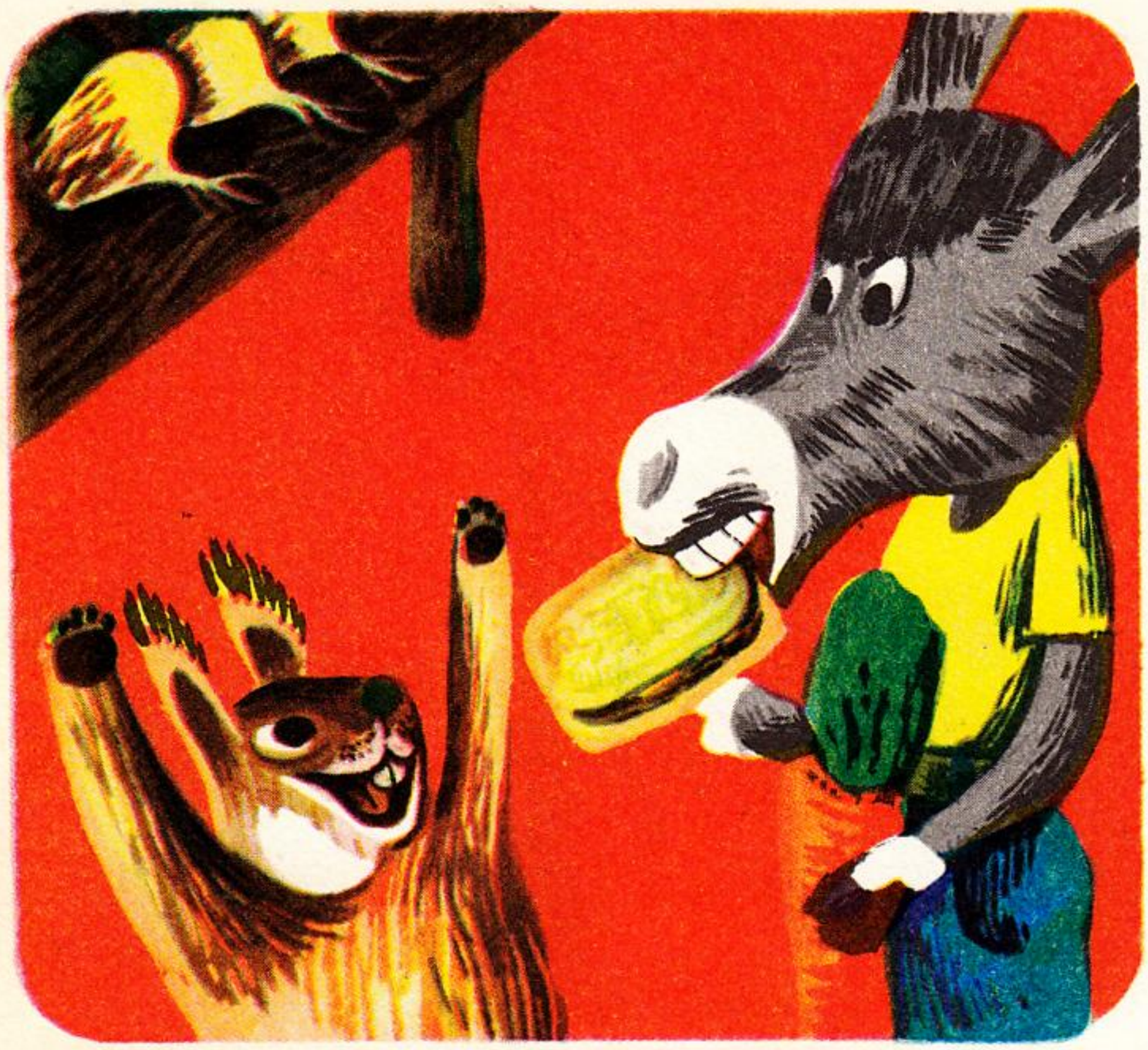
SQUIRREL: Little donkey, what are you doing here?

LYAPA: I'm washing my carrot.

SQUIRREL: But you don't wash carrots with soap!

LYAPA: Hare told me to.

SQUIRREL: Hare couldn't possibly have told you any such thing. Nobody washes a carrot with soap. You just rinse it with water.



LYAPA: Well, I'll rinse my carrot and eat it. Ugh! it tastes bitter and horrid!

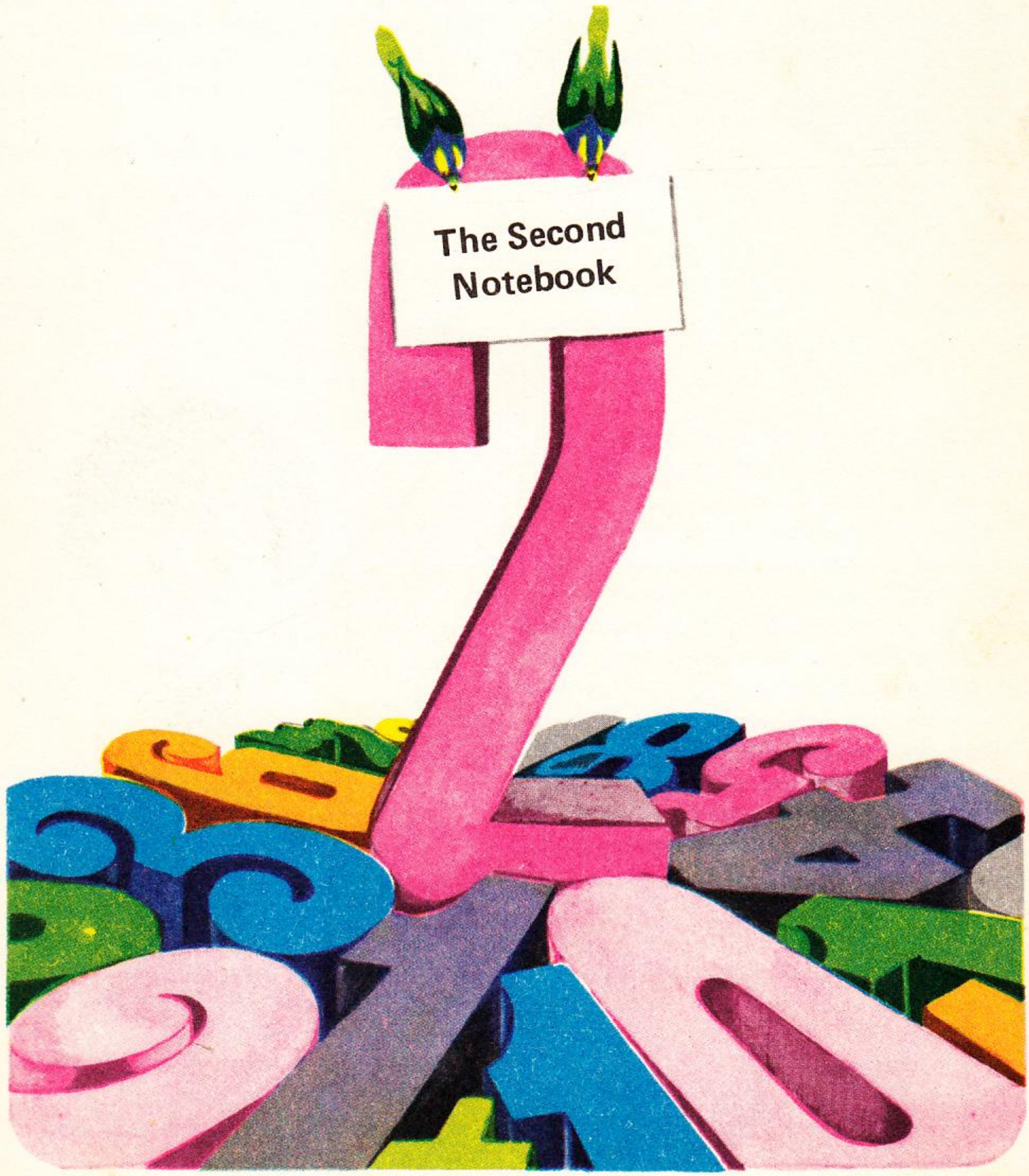
SQUIRREL: Ha! Ha! Ha! You got it mixed up, Lyapa! You're eating soap instead! And why did you come to the market anyway!

LYAPA: To buy some hay.

SQUIRREL: You're too late, little donkey. The market is closing. It's time to go home.



MUMMY: You see, Lyapa, I was right. You've got everything all muddled up. You have to know a lot not to get in a muddle.


The Second
Notebook

Next day Petya wouldn't be parted from his notebook. All day long he drew ones, and all sorts of things that come in ones. At last he went to Mummy and said, "The first number is one, and the next is two. That's right, isn't it?"

"Yes," Mummy agreed smiling. "That's right."

"Will you write two in my notebook, please?"

"Yes. Here you are. This is how you write it."

2

Olya, who was eating her porridge, peered into Petya's notebook and said, "Show me! I want to see! Show me your two."

"Finish your breakfast," said Mummy, "and then we'll go on with our maths."

Olya ate up her porridge. "Now show me number two," she said. Petya showed her.

22222

"I want to draw two, too," said Olya.

"It's a bit too soon for you to start drawing twos, little one," said Mummy. "Let Petya do them. You and I can just count to two. For instance, can you tell me how many hands you've got?"

"One, two," Olya raised her hands.

"What does that make?" Mummy asked.

"Two."

"That's right. And how many feet have you got?"

"Two," counted Olya.



Mummy was going to ask more questions but Olya went on counting on her own. "One nose and one mouth and two eyes and two ears and..."

"Wipe your right ear with your hanky. You've got porridge on it."

Olya took her hanky out and rubbed her ear.

"Look! She's mixing up right and left, like Lyapa the donkey!" Petya cried.

"He's right, little Olya," said Mummy. "You're wiping your left ear. The porridge is on your right one. On the same side as your right arm. You eat and draw with your right hand. Now hold the hanky in your right hand and wipe your right ear."

Now you raise
your right hand.
Now raise your
left hand.
Hop on your right
foot. Now hop on your
left foot.
Which foot
do you hop
better on?

Olya raised her right hand.



Then her left one.



Then she went and told her dolls which was the right hand and which was the left.

Petya stopped writing twos and put his notebook aside to wait for Daddy to come home. When he came he said proudly, "Today I've been writing one and two. I know two now, so let's write three. Teach me three, Daddy."

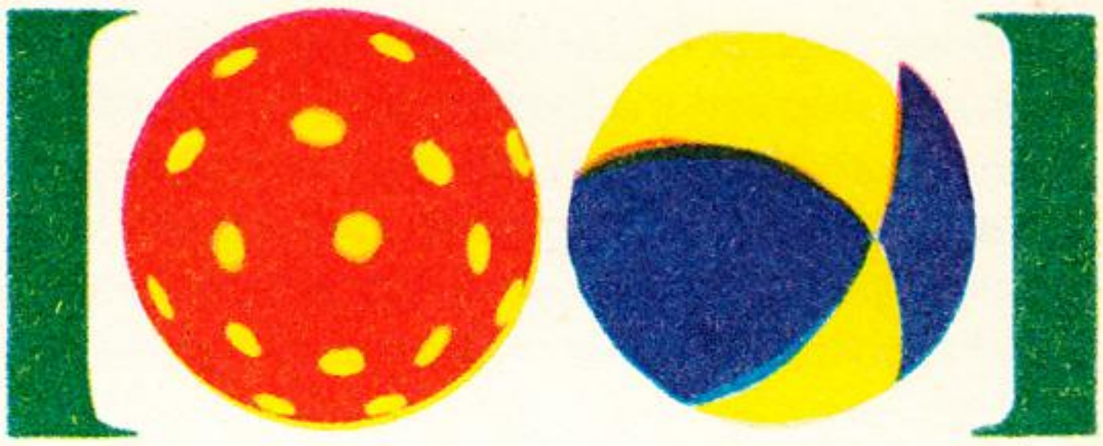
"There'll be plenty of time for that," said Daddy. "Simply writing numbers doesn't mean you really know maths. The most important thing is learning to do sums. Here, can you answer this question? A boy had one ball.

[]

His father bought him another ball. How many balls did he have altogether!"

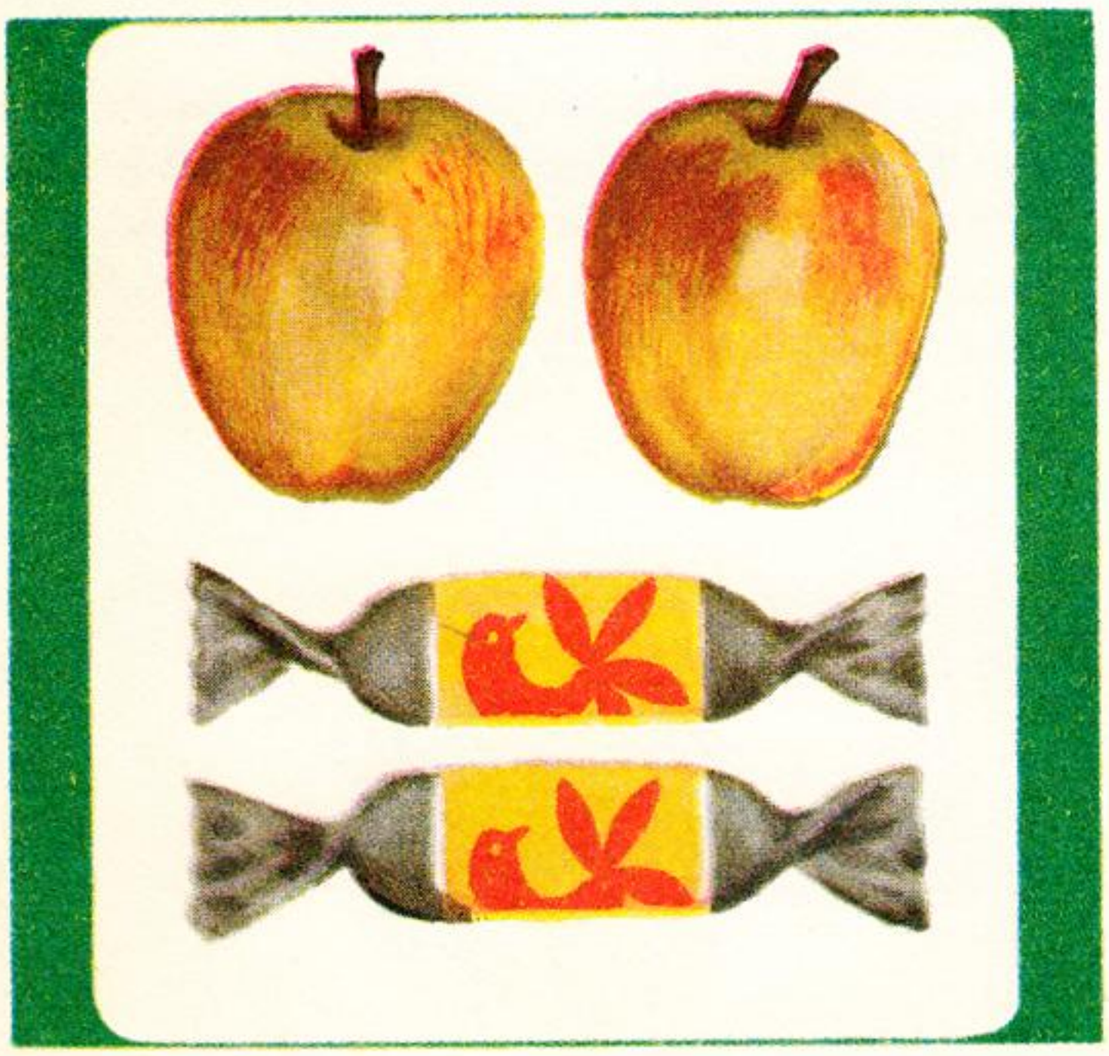
"Two," said Petya promptly.

"That's right. Here's another question. There was one taxi at the taxi-rank. Then another drew up. How many taxis were there then!"





"But that's exactly the same question as the first one," said Petya. "I can think of lots of questions like that on my own. One sweet, then another sweet. One apple, then another apple. The answer's always two."



Now you think of questions like these.

Daddy was very pleased. "That's right, Petya. It doesn't matter what we're counting, balls, cars, apples. One and one makes two. Get your notebook. I'll show you how to write it.

1 + 1 = 2

Say it after me: one and one makes two."

Now you say it.

Petya said it after Daddy. Then he added, "I see. The cross means 'and', and the dashes mean 'makes'. That's right, isn't it?"

"That's it," Daddy nodded. "The little cross is called the plus sign. So we say 'one plus one makes two'."

Petya wrote it carefully into his notebook. The pattern was like this:

1 + 1 = 2

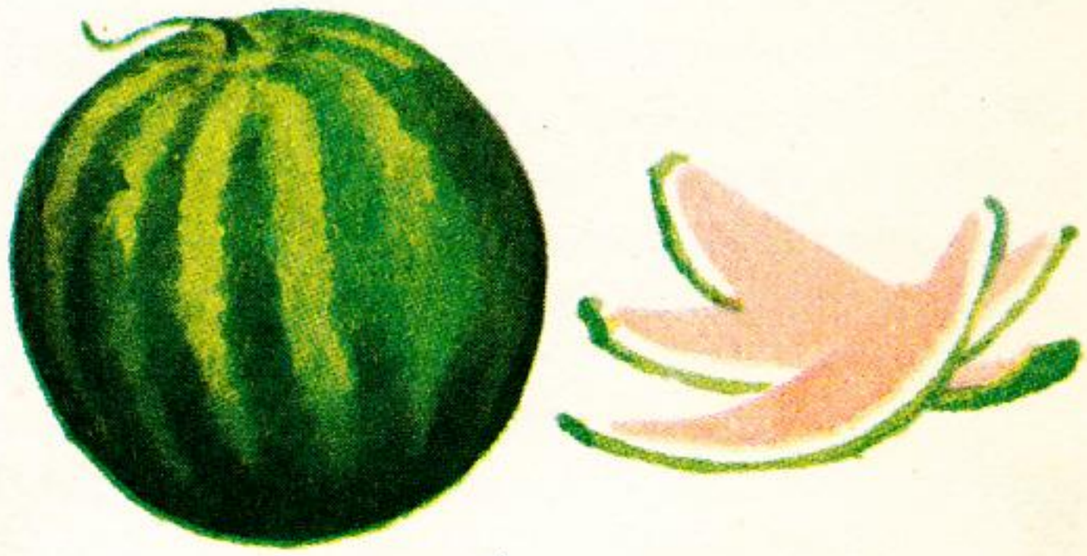
Then he started writing plus signs. But soon he was bored.

"Let's do another sum, Daddy," he said.

"All right. Mummy bought two water melons.



We had one for supper.



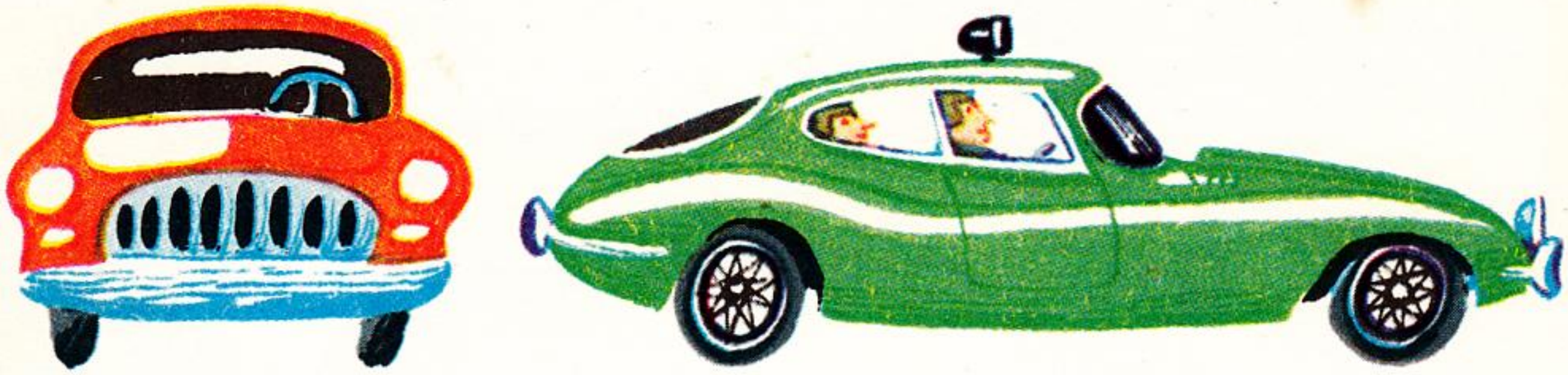
How many were left?"

"One," said Petya.

"Right. Now, you think of one."

Petya thought for a moment. Then he said, "Mummy bought two pineapples..."

"No, no," interrupted Daddy. "That's the same question as before. We ate one up. How many were left? You'll have to think of something different this time. How about the two taxis at the taxi-rank? What happened next?"



"One drove off," said Petya.

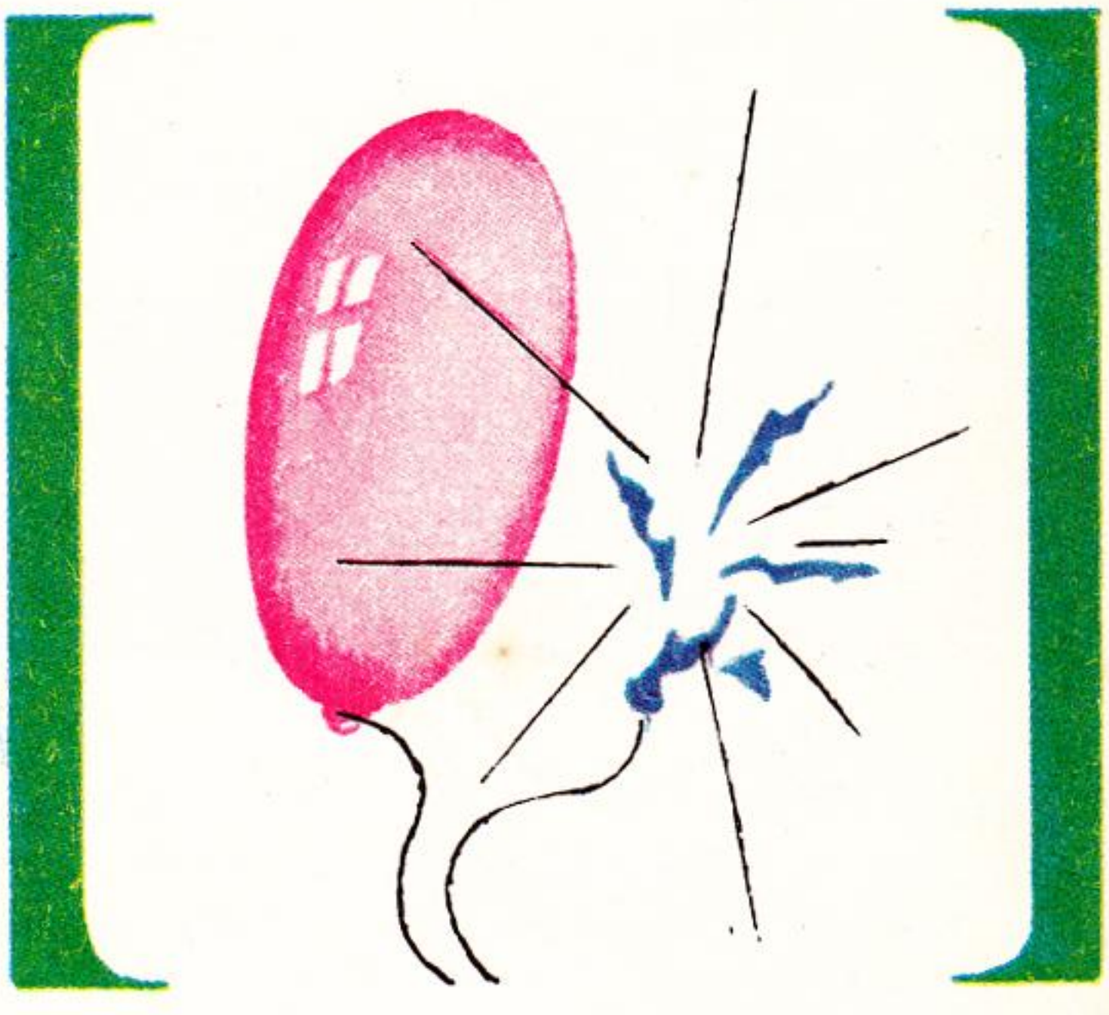
"Yes, and then?"

Petya wasn't sure.

"Look, every sum has a question, something you want to find out. What do we want to find out this time?"

"How many taxis were left," said Petya. "One," he added.

"That's right. We can make up lots of sums like that one. There were two birds on the roof and one flew away."



"There were two balloons and one burst," said Petya, getting the idea.



Can you think of sums like these?

"In every one of these sums the question is, how many were left?" Daddy said. "And each time the answer is one. We can write it like this:

2 - 1 = 1

"Two take away one is one."

"Take away..." said Petya. "I've got a sum. If Olya has two sweets and I take away one from her how many will she have left?"

"That's not the kind of sum I'm prepared to help you with," said Daddy. "Try this one. Petya has one bicycle. If I take it away from him, how many will he have left?"



"None," said Petya sadly. He didn't like this talk about his bicycle being taken away. But Daddy wanted to teach him a lesson and pretended not to notice his dismay.

"That's right. There'll be no bike at all. This is how you write it."

1 - 1 = 0

Petya frowned.

"Never mind," said Daddy with a smile. "We were both joking. I won't take away your bike, and you won't take away anyone's sweets. As for the pattern, you weren't very interested in it, were you? Anyway, here's another sum."

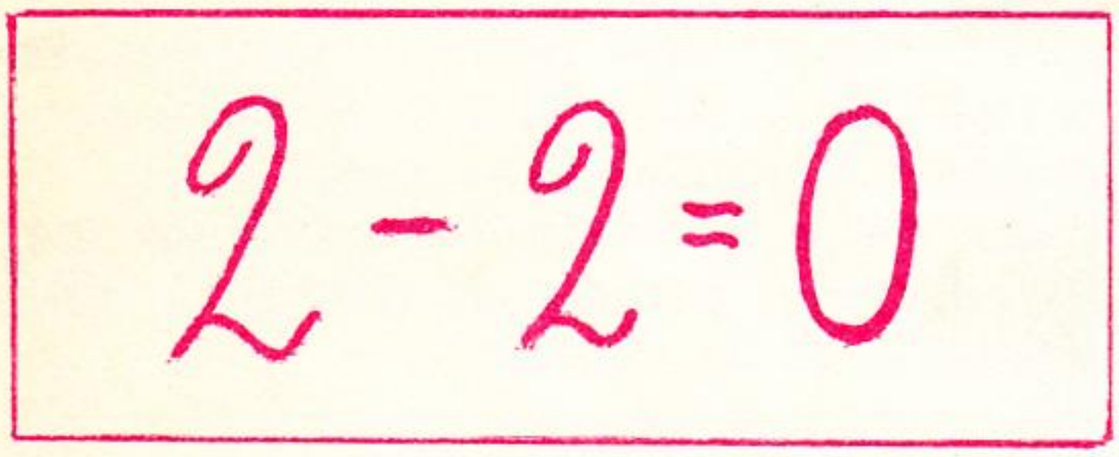
But Petya looked at the notebook and asked, "How do you say that one? What does the circle mean?"

0

"It's not a circle. It's a nought. Nought means nothing. So the pattern reads, 'one take away one is nought'. Here's a problem to show how this pattern works. Olya had one sweet and she decided to give one sweet to Petya. How many sweets has she got left!"

"None," answered Petya, and added, "nought. Listen, Daddy. This time Olya can have two sweets. And she decides to give two sweets to Petya. How many will she have left! None," he went on, answering his own question. "How can I write it, Daddy!"

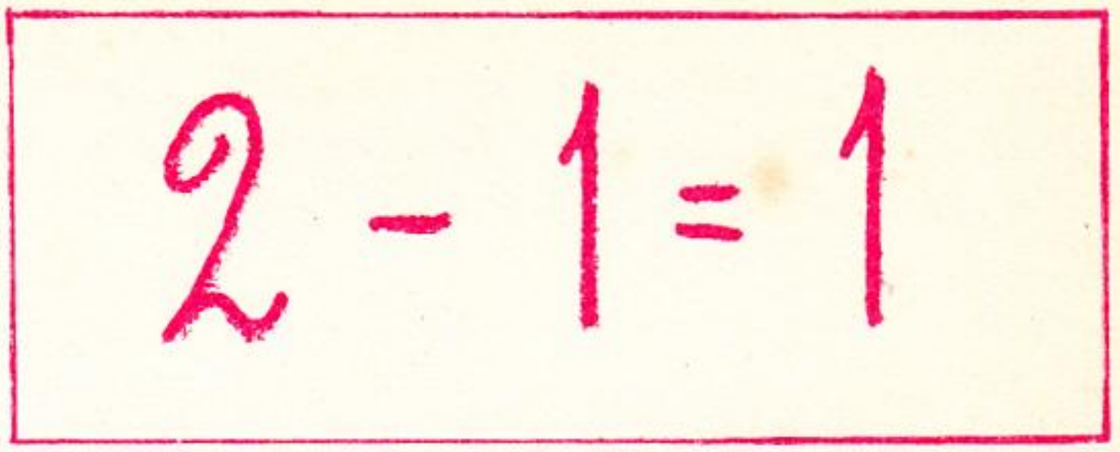
Daddy smiled. "All right. Let's write down the answer to a question from a greedy boy who doesn't think one sweet enough. Two take away two leaves nought."



Petya looked carefully at the patterns in his notebook and said, "I've got it! The line between the numbers means take away. Has it got a special name, like the plus sign!"

"Well done, Petya! You *have* got the idea. It's called a minus. So we can say:

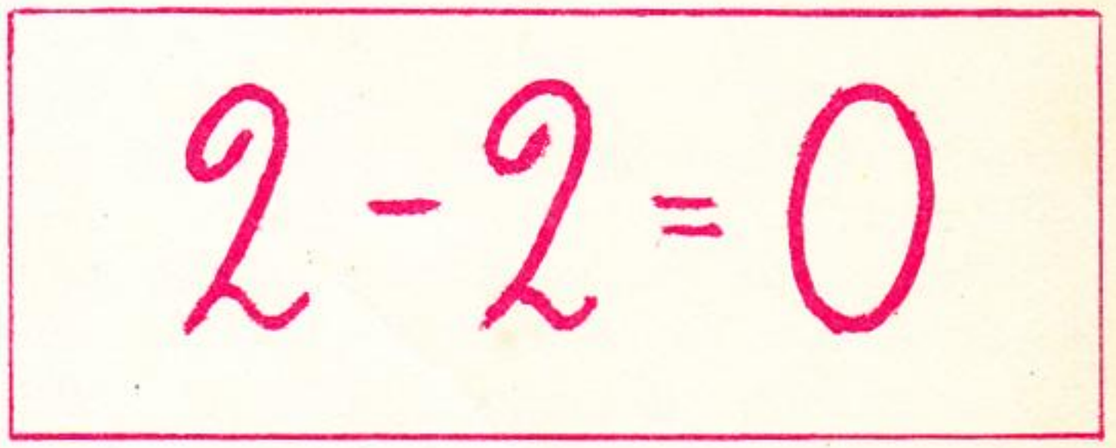
two minus one leaves one,



one minus one leaves nought,



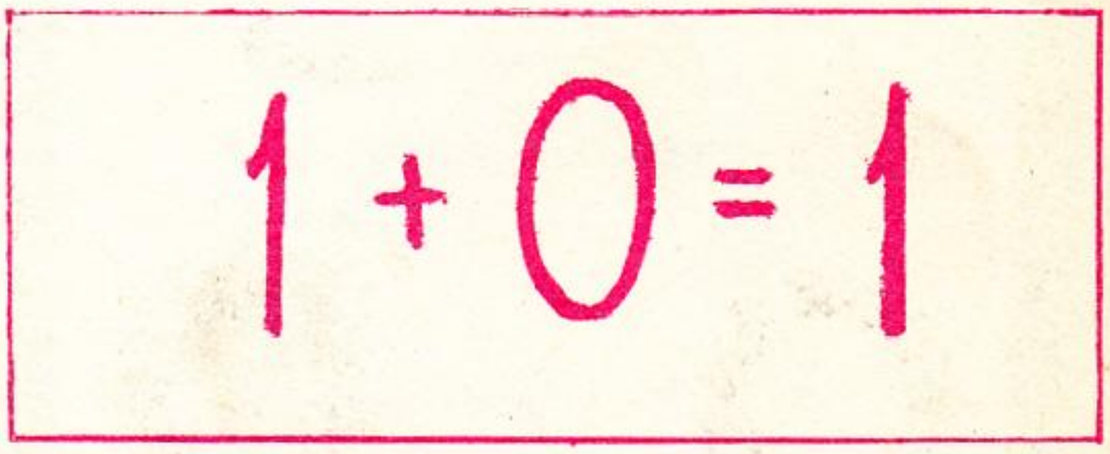
two minus two leaves nought.



And that's enough for today. You're tired."

"I'm not tired! And anyway the sums were easy! Let's do one more. Please let's!"

"Very well. Here's one last sum, a bit trickier this time. Here's the pattern:



Can you do it!"

Can you work out the answer to Daddy's question!

Petya began to think, "One plus nought means we add nothing, then we are left with what we had."

"The answer is one," he happily announced.

1 + 0 =

"That's right. Close your book now. But don't forget to practise by yourself tomorrow. Write lots of numbers and pluses and minuses. And here are some sums you can do too."



EXERCISES EXERCISES

1. What are these numbers called?

120

2. What are these signs called?

+ −

3. Give the answers:

1 + 1 =
1 − 1 =
2 − 1 =
2 − 2 =

4. Give the answers:

1 + 0 =
2 + 0 =
1 − 0 =
2 − 0 =



5. A sweet costs 2 kopecks. How many kopecks do you need to pay for one sweet? (You can also pay with one coin, a two-kopeck piece).



6. What is the time by this clock?



And by this one?



7. Say the name of the first day of the week and the first month of the year. What is the second day of the week? The second month of the year?





The Third Notebook



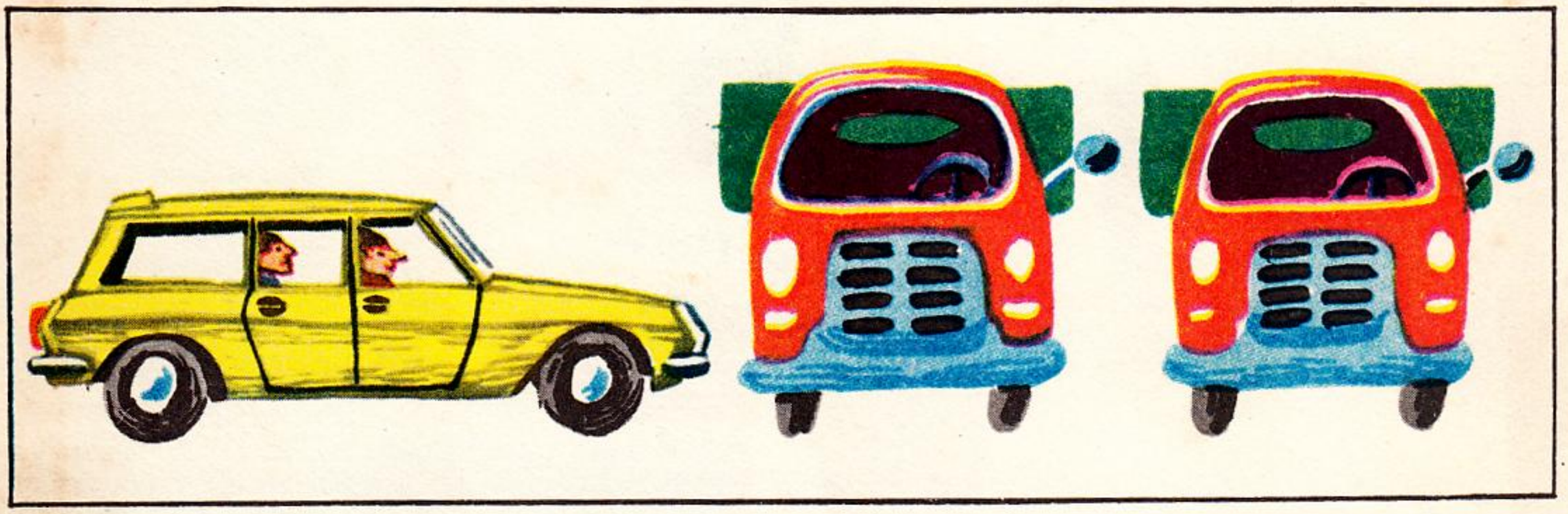


Petya remembered that Daddy had told him to practise. So he wrote all the numbers he now knew carefully into his notebook. Then he wrote plus and minus signs and made up some sums of his own.

"It's easy! Two lorries and one car. Two plus one makes three."

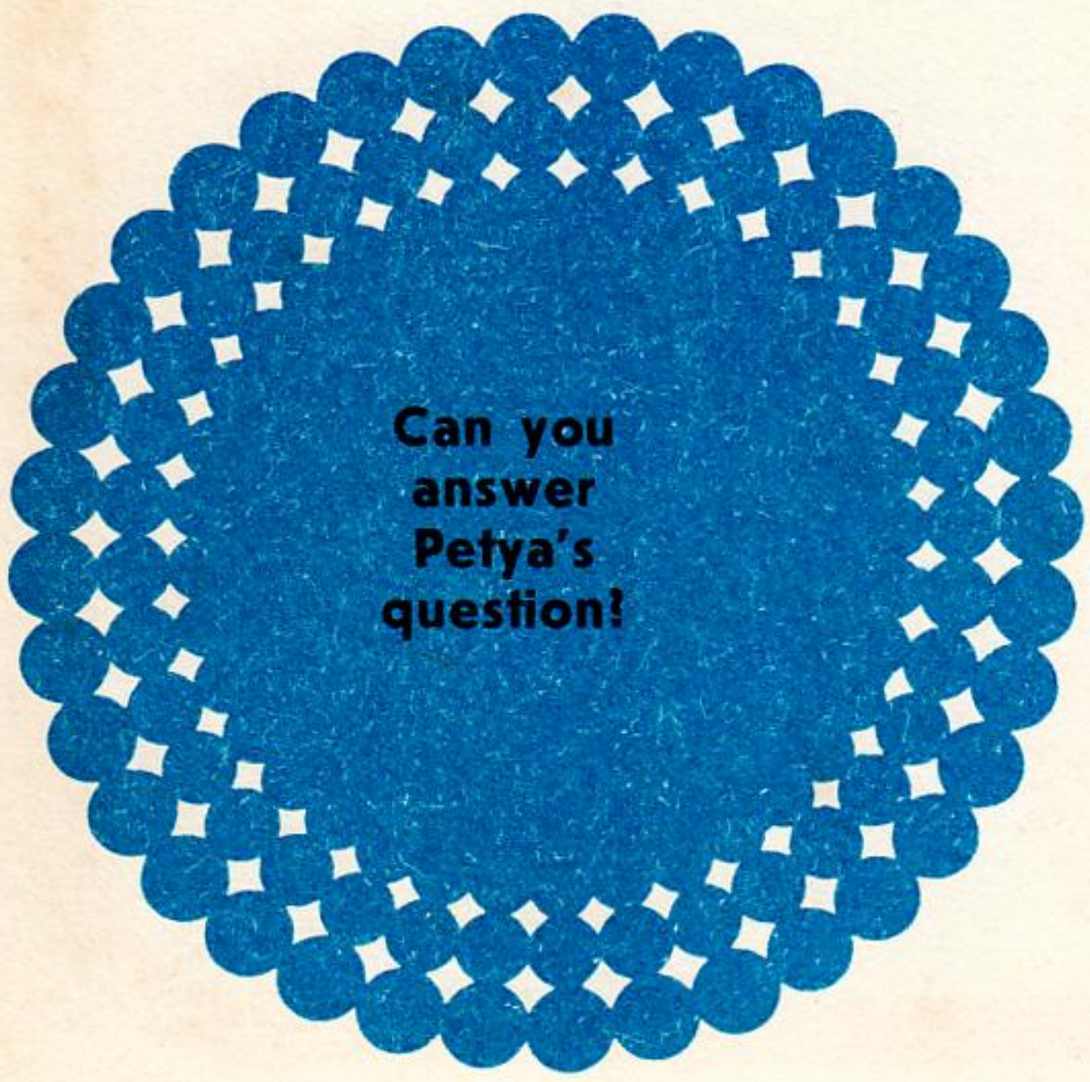
"Write it down, then."

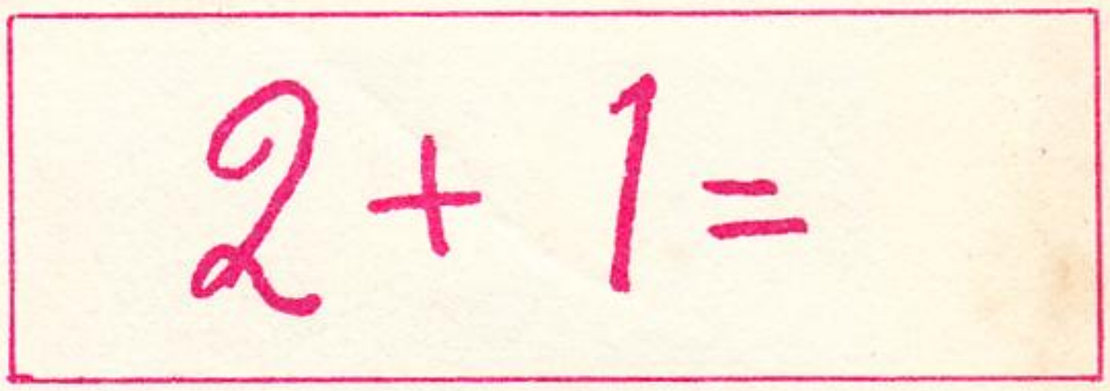
"Just a second. I can't finish the pattern, Daddy. You haven't shown me how to write a three."



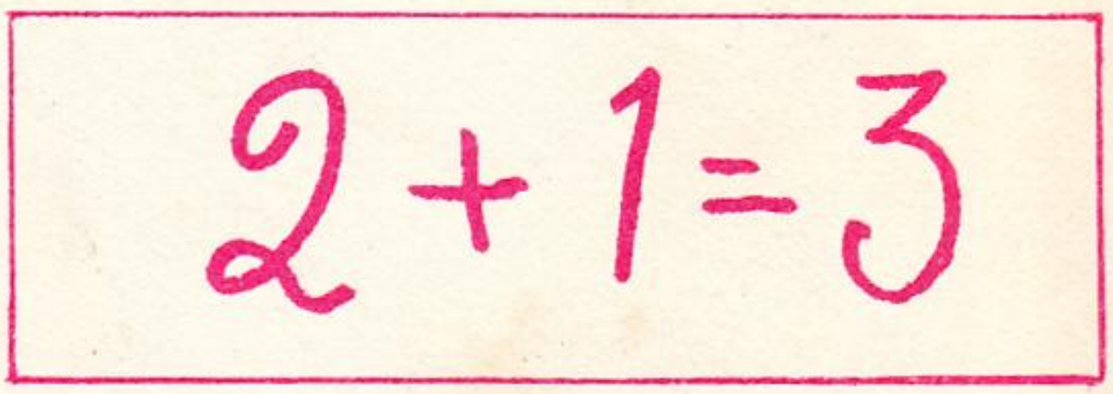
"I say, Daddy," he said, "I've thought of one. There were two lorries in a garage and a while later a car came along. How many motors were there altogether? Is that a good question?"

"Very good," said Daddy. "And what's the answer?"





"Here." And Daddy added a three to Petya's pattern. "Now read it," he suggested.



"Two plus one makes three," said Petya.

Just then Olya put her head round the door.

"Daddy's shown me how to write a three," said Petya. "You don't know anything about it."

"Yes, I do! I know stories about three. Mummy's just read me a story called 'The Three Little Pigs'," said Olya.



"And I know the story of the 'Three Bears'."

**Do you know about the Three Little Pigs and the Three Bears?
Do you know any other stories and nursery rhymes and songs with three in them?**



"Stories!.." said Petya. "Stories don't count. You have to know how to do sums. Three minus two — how much is that!"

Do you know how much three minus two is!

3 – 2 =

Write it down.

On the point of tears, Olya turned to Daddy. She couldn't count as quickly as that yet.

Daddy came to her aid at once. "There, there, little Olya... We'll do Petya's sum in no time at all. Let's put three dolls on the table.



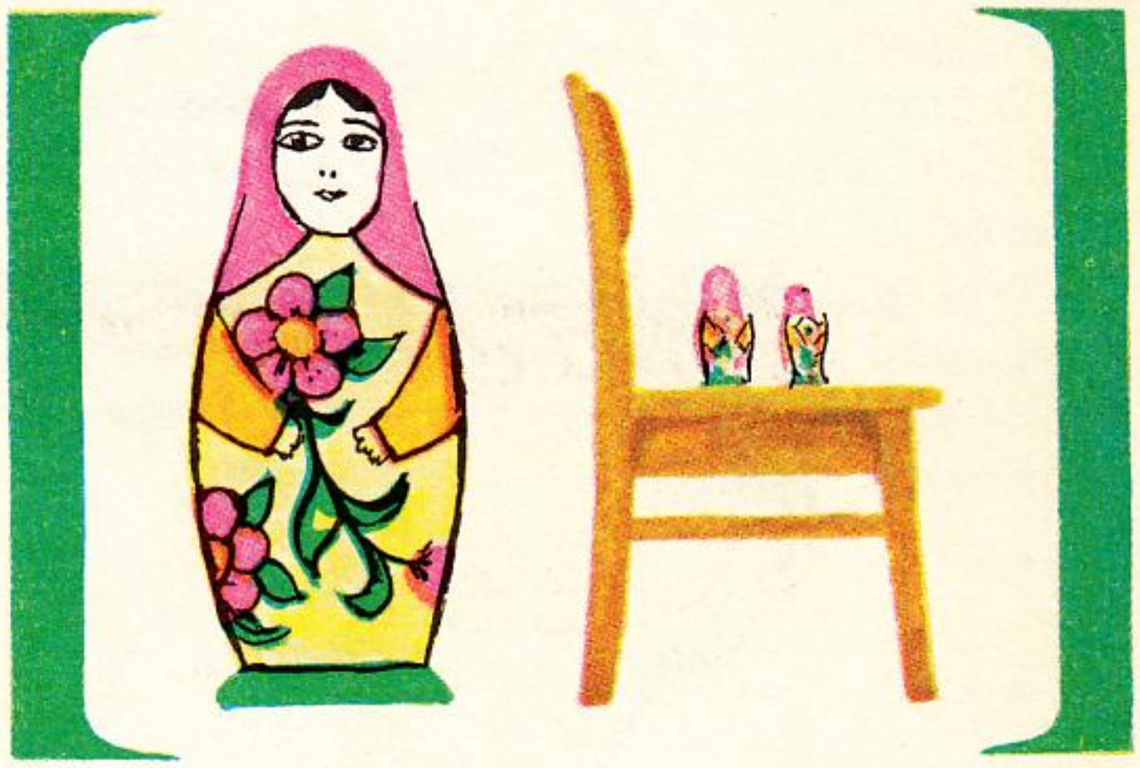
"What's three minus one?" asked Olya.

"Do it yourself this time," said Daddy. "Put the three dolls back on the table. Now, take away one."

3 – 1 =

What number should we write here!

Now take away two.



How many dolls are there left!"

"One," said Olya, recovering.

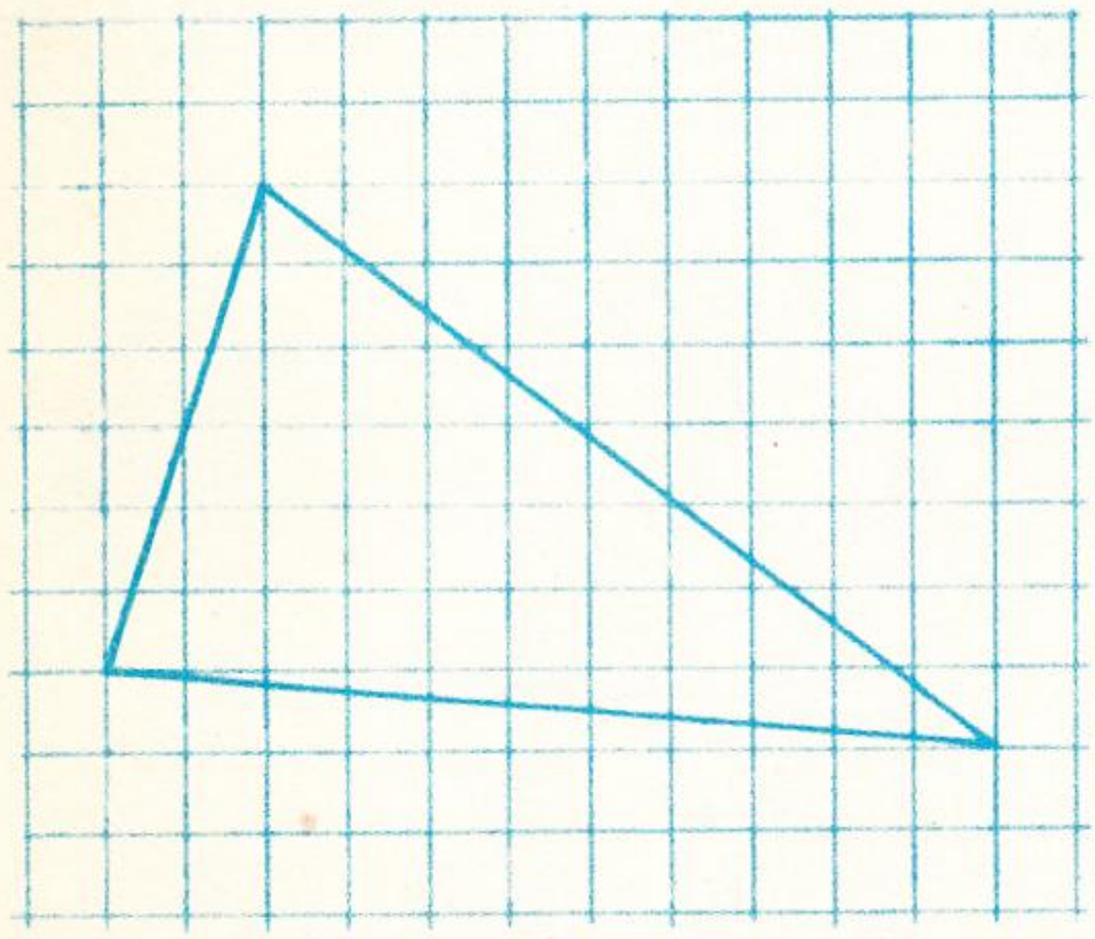
"So you were able to work it out as well. Three minus two leaves one. Petya will show us how to write it."

3 – 2 = 1

Olya busied herself with her dolls and Daddy went on talking to Petya. "So far we've only looked at numbers," he said. "But maths isn't just numbers."

"I know," said Petya. "You said maths is about shapes too. Will you teach me shapes as well?"

"I'm going to show you something," said Daddy. "Get out your notebook. Now watch. I'm going to take the ruler and draw a shape.



Do you know what it's called?"

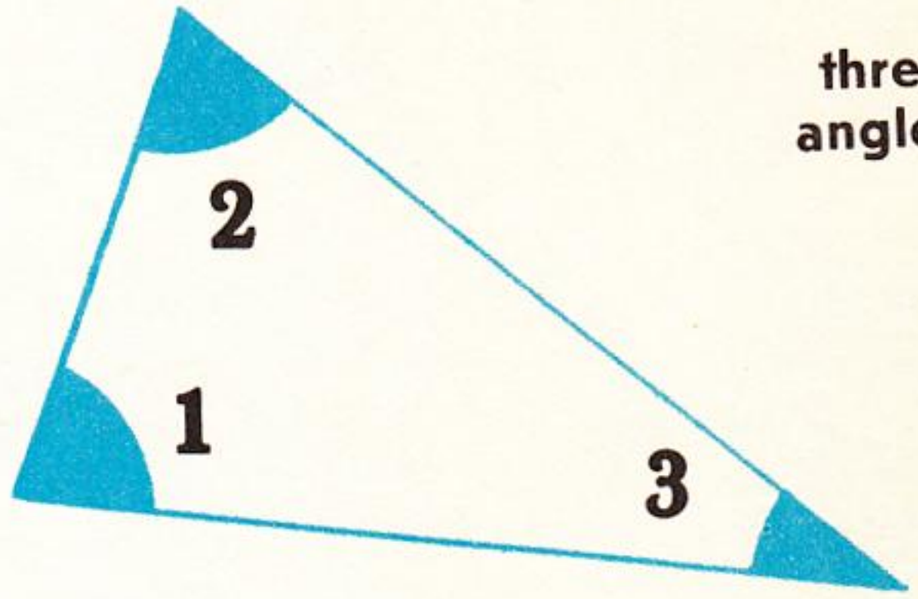
Do you know
the name
of this shape?

"No," said Petya.

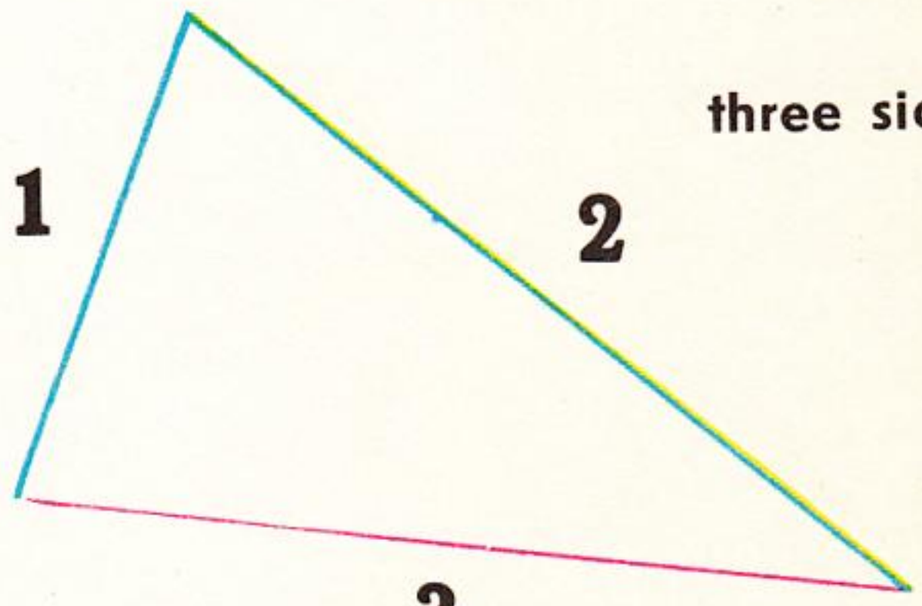
"It's a triangle. Can you guess why it's called that?"

Petya was thoughtful. "Is it because it has three angles?" he asked.

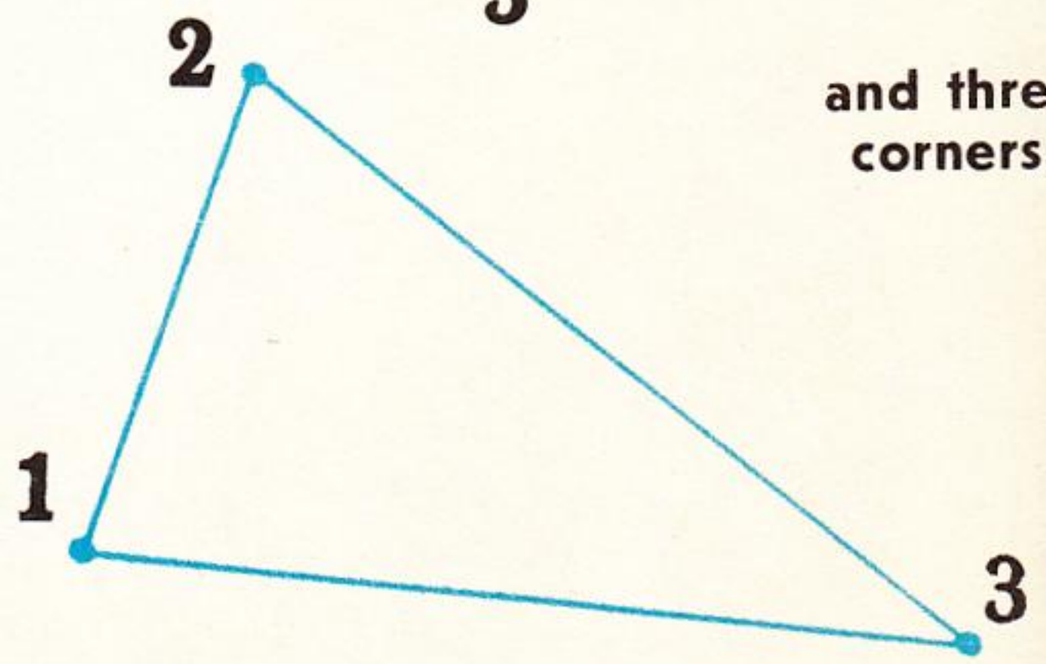
"That's it. A triangle has three angles,



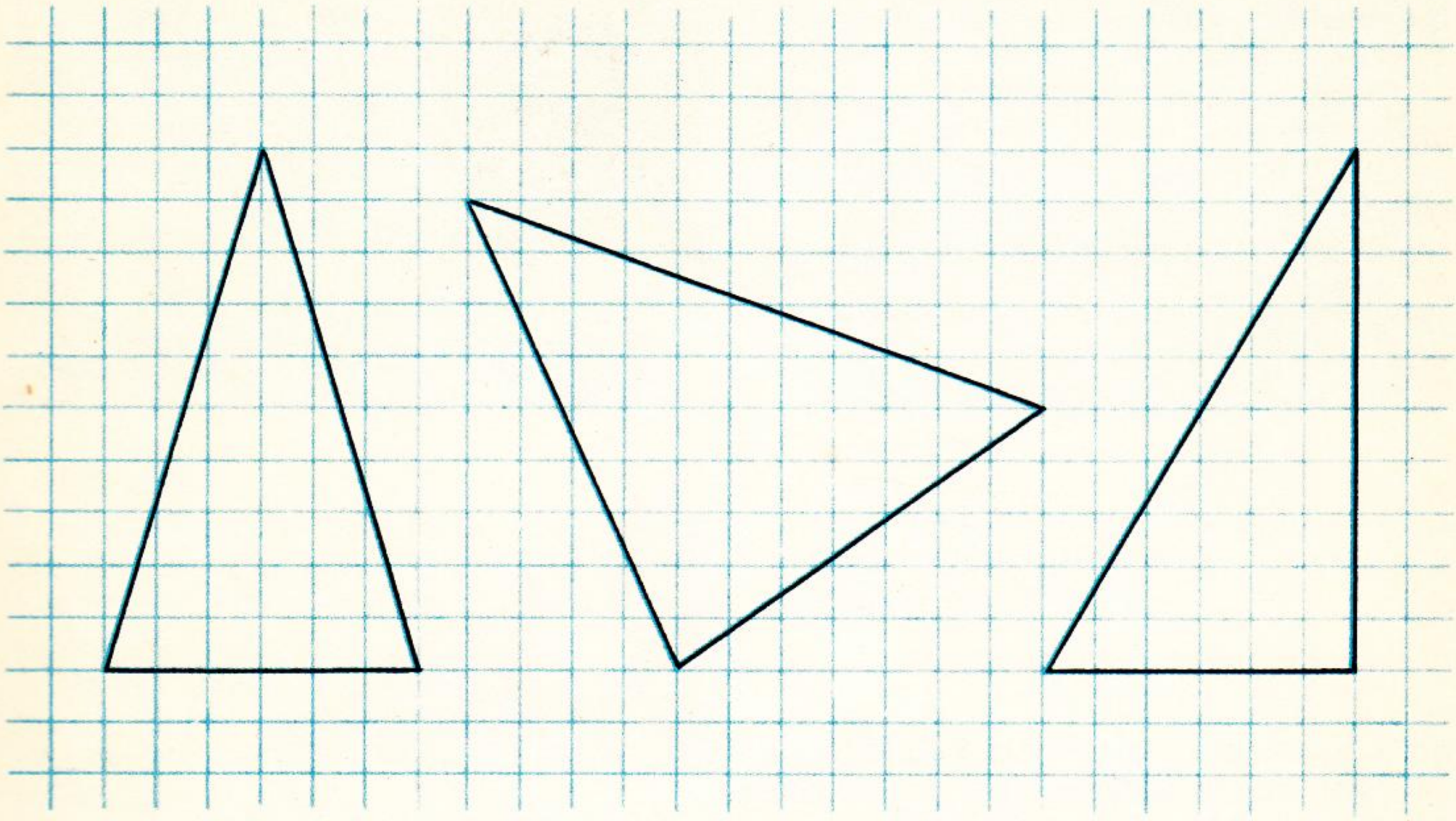
three sides



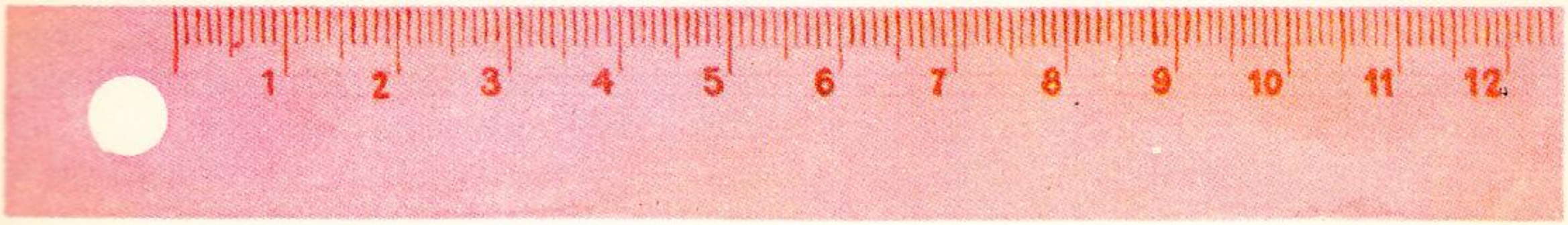
and three corners.



Look, here are some more triangles.

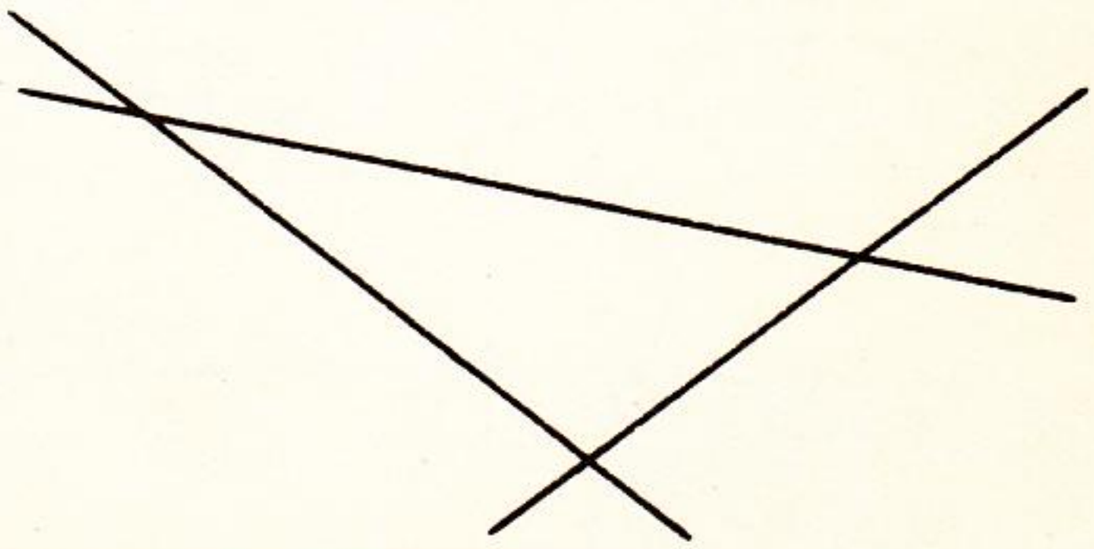


Now you try to draw one. Here's the ruler."



Now you take a ruler and try to draw a triangle.

And this is what Petya managed to draw.



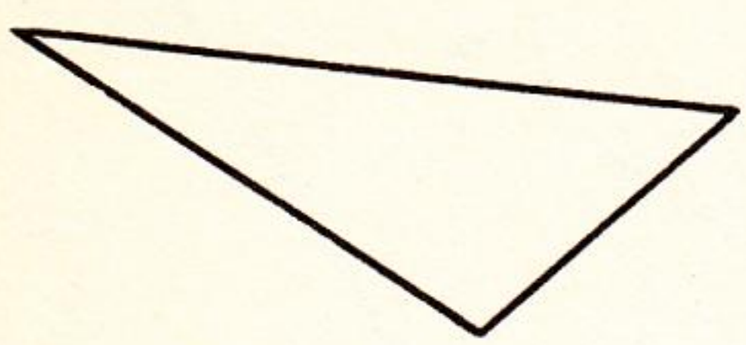
Daddy laughed. "That's a hairy old triangle," he said. "It's got whiskers sprouting out of every corner, as if it needed a good shave."

"Won't it have to go to the barber's!" asked Olya.

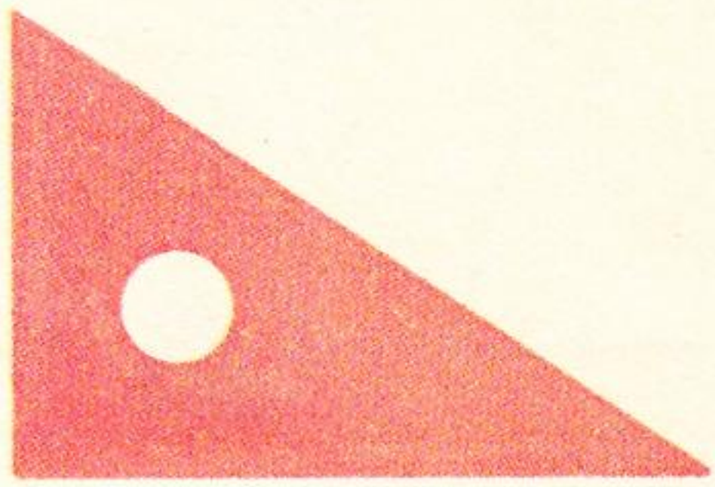
"No, we'll shave it ourselves," said Daddy. "Take the rubber and rub the hair out. That's it. Now it really is a triangle.



Olya saw a book, stretched out her hand and then hesitated. "Is it a triangle!" she asked.



"No, darling, a book is a different shape. But there's a triangle beside it. Look."



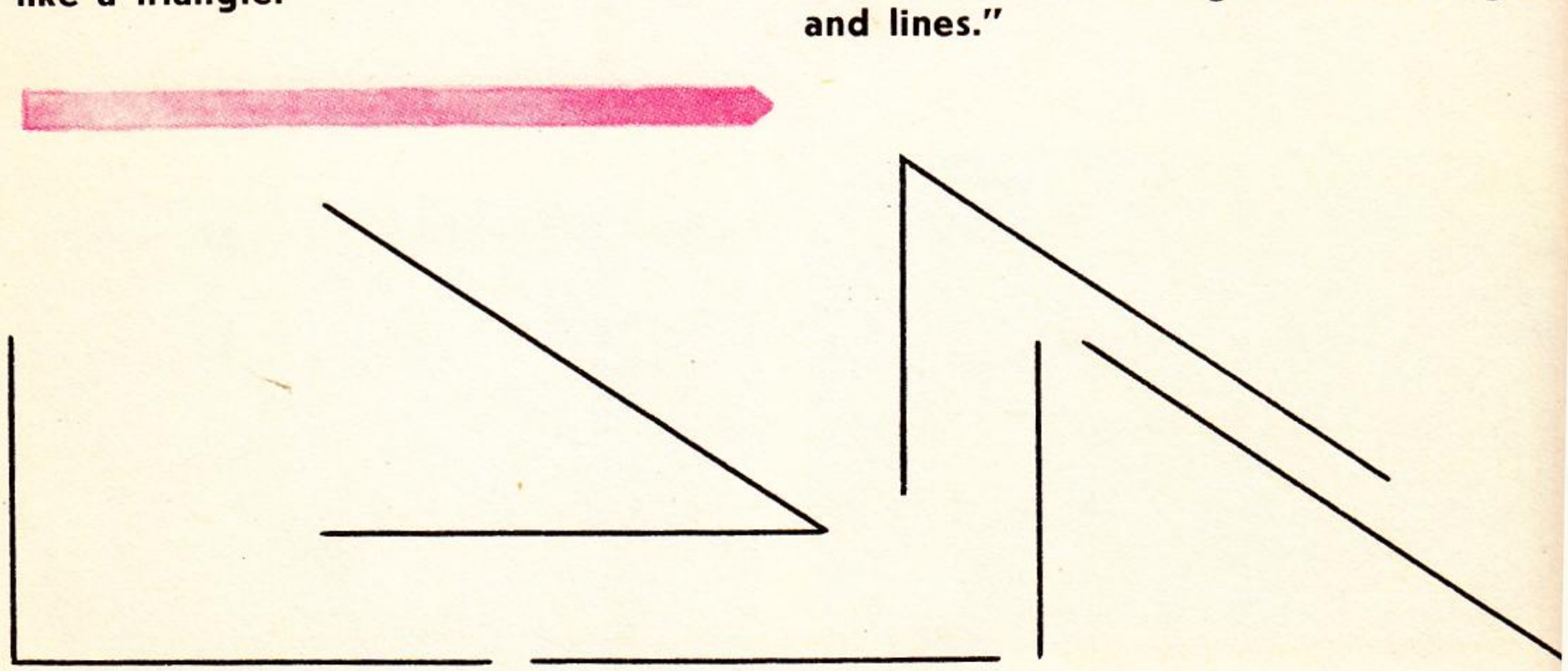
Let's try another, shall we, Petya!"

Petya looked at Olya. "Let her do one. We'll see what she can do."

Daddy shook his head. "You do it. We'll give Olya an easier job. Come on, Olya, look round the table and see if you can find anything on it that looks like a triangle."

Olya was about to pick it up when Petya exclaimed, "Give it to me! I'll draw round it with my pencil and then I'll have a nice triangle in my notebook."

"Not a bad idea," smiled Daddy. "You can also use this triangle to draw angles and lines."



Now you draw
some triangles like Petya's
in your notebook.

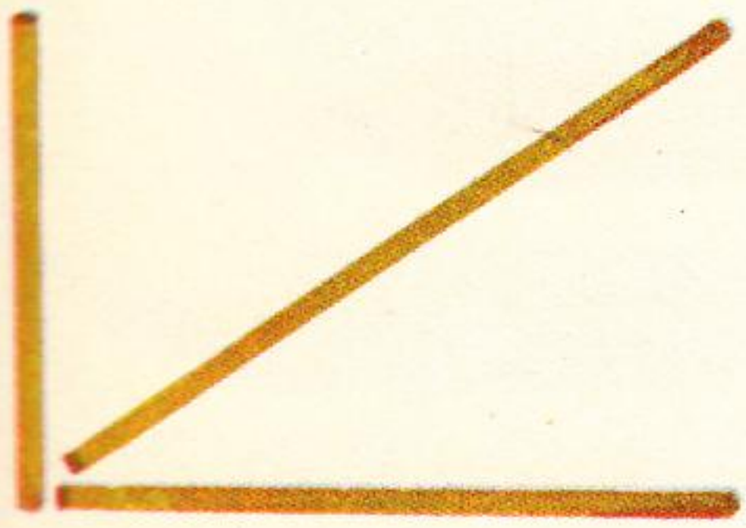
Are there any other ways
in which three lines
can be joined up?
Think about it,
and then draw them
in your notebook.

Petya liked his drawings. "Look, Daddy, I've done a whole triangle and then I've done different angles and different sides."

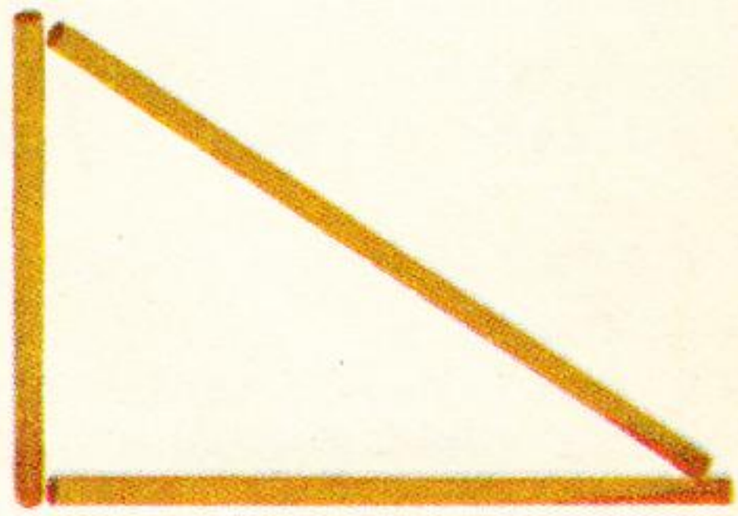
"If you draw the sides by themselves they're called segments," said Daddy. "So what you've drawn under the angles are segments."

"But what if the ends join up again? Do they become the sides of the triangle again?" Petya asked.

"It depends how they join. If you take little rods instead of segments you can see how many ways they can be joined in. Like this, for instance. That's not a triangle."

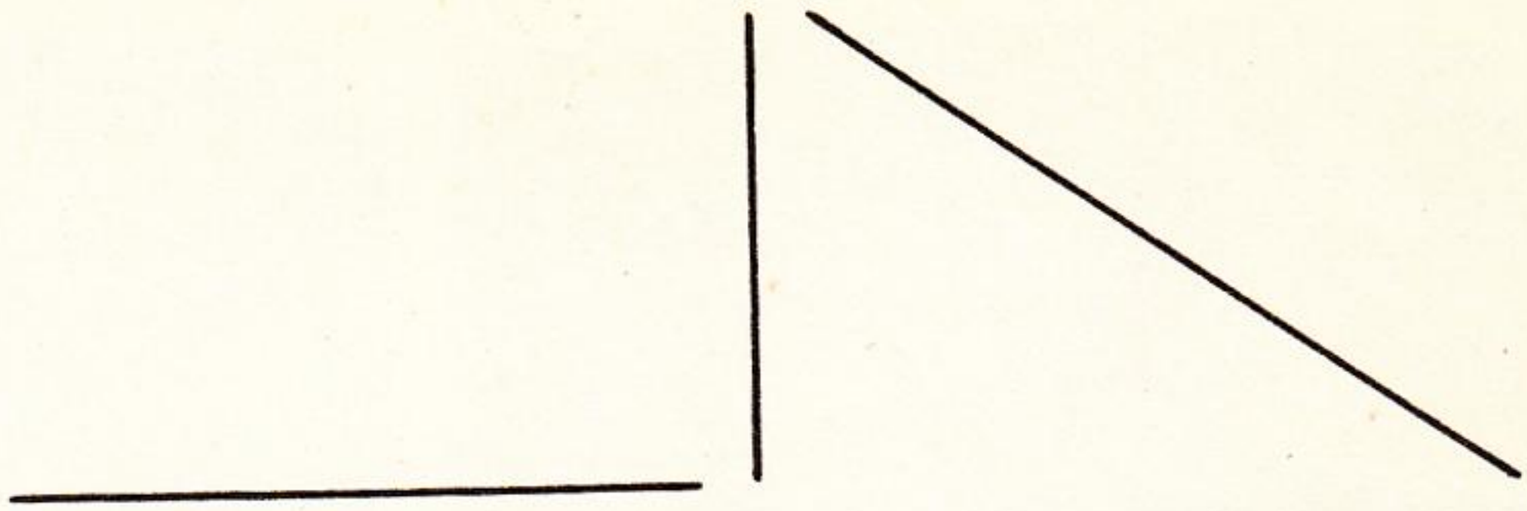


"No," agreed Petya. "It doesn't look like one. But if you put the biggest rod back here, that's a triangle."



"That's right," said Daddy approvingly. "But when you're talking about rods, you should say the 'longest', not the 'biggest'. Look at the segments in your notebook again.

Which is the longest and which is the shortest?"



Now you say which is the longest and which is the shortest.

Petya opened his mouth to answer but just then Daddy noticed that Olya was upset. Petya had taken the triangle and she was feeling left out. Daddy winked at Petya and said, "Let's ask Olya to tell us which segment is longest and which is shortest."

Immediately Olya cheered up and pointed to the segments. Daddy nodded approvingly, but Petya cried, "Don't just point to them! Say which is which!"

"The shortest is in the middle and the longest is beside it."

"That's not clear," said Petya. He couldn't stop himself now. "There are two segments beside the shortest one."

"Do you know how to say it properly yourself?" Daddy asked him.

"Of course I do. The longest segment is on the right of the shortest. See?"

"I see. And what about the one on the left? What sort of segment is that?"

Petya was confused. "It isn't anything."

"Why isn't it anything? Is there nothing you can say about it? Let's compare it with the shortest segment. What can we say about it then?"

"It's longer than the shortest segment," said Petya.

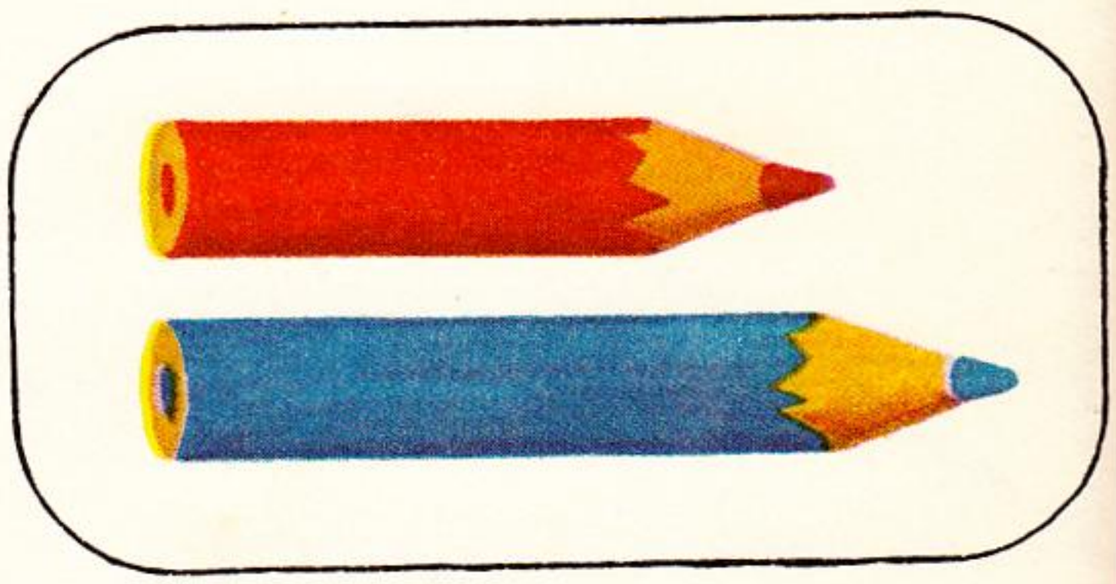
"And if you compare it with the longest?"

"It's more shorter than the longest," Olya said.

Petya laughed. "More shorter! The right answer is 'shorter'."

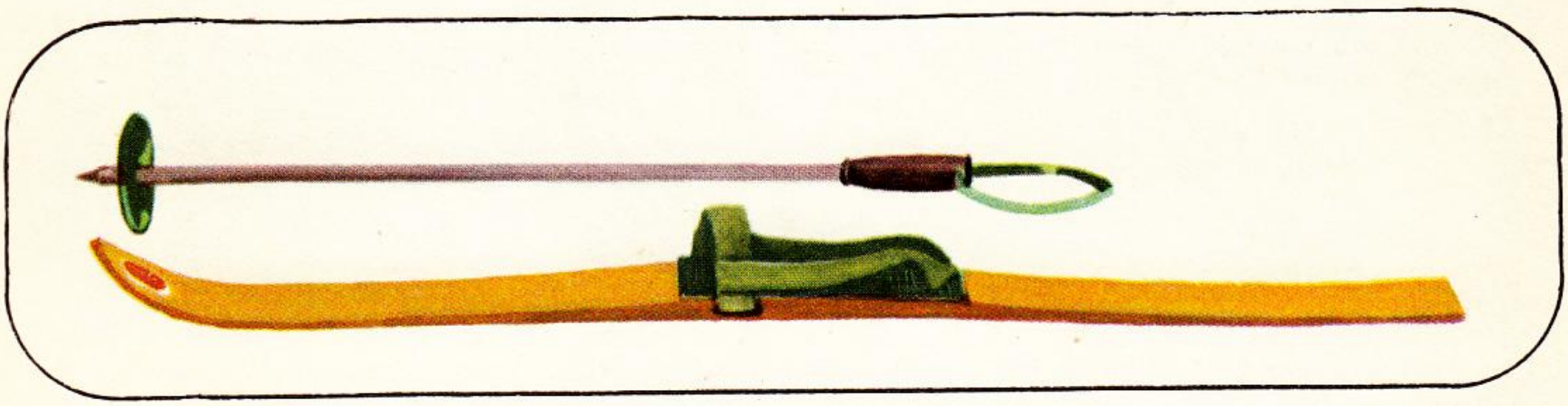
"Yes, darling, he's right. The right way to say it is 'the segment on the left is shorter than the longest one'. Come on, say it."

"I'd rather compare pencils." Olya laid two side by side. "The red pencil is shorter than the blue one."

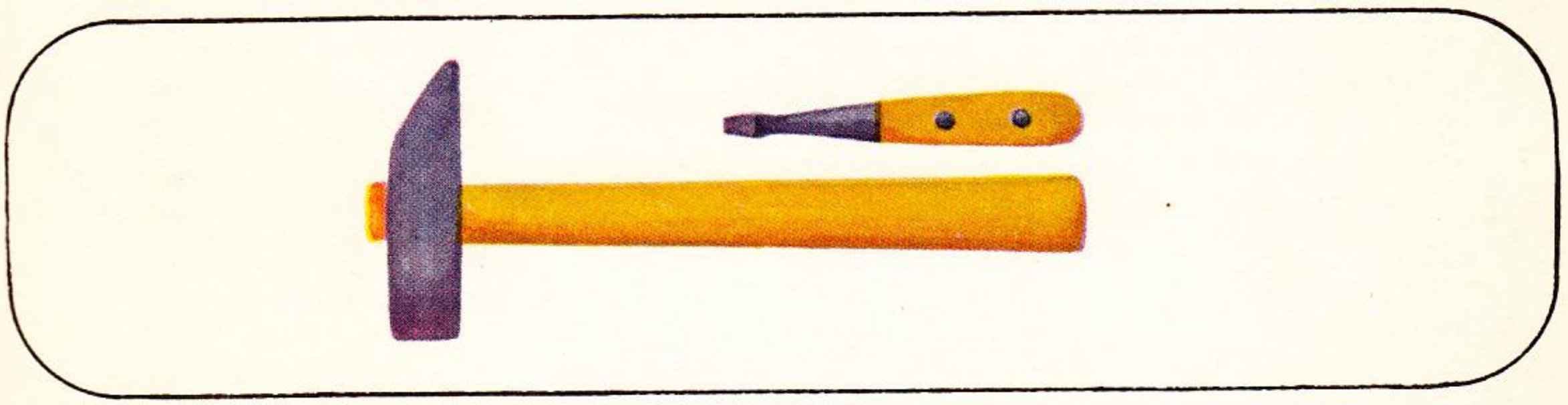


"Or, the blue pencil is longer than the red one," said Petya.

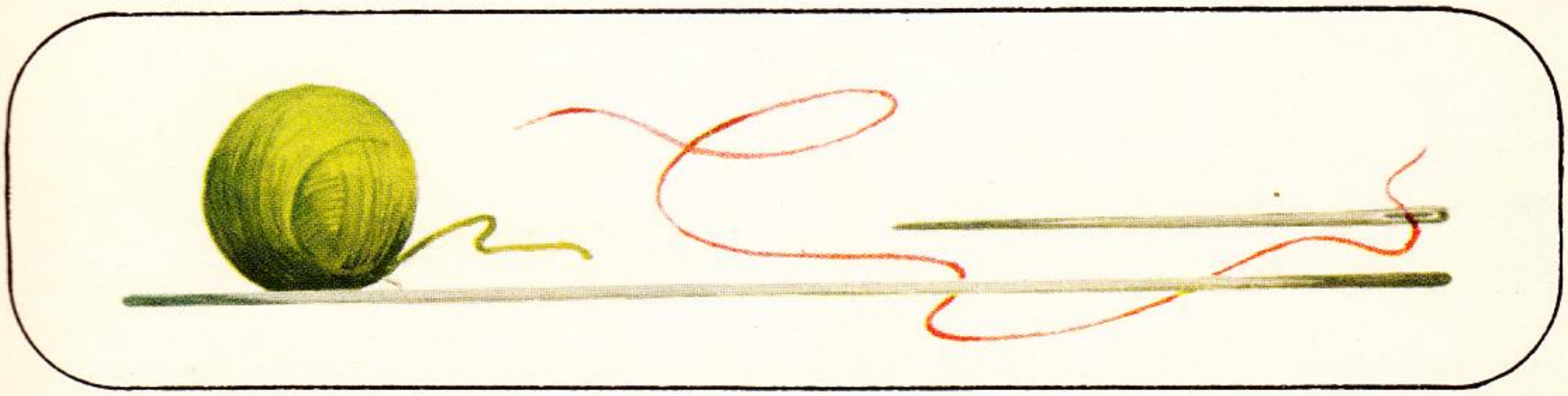
"Exactly," said Daddy. "If one thing is shorter than another, then the other thing is longer. Let's think of some things and compare their lengths. Olya's just compared the pencils. Now, Petya, you have a go."



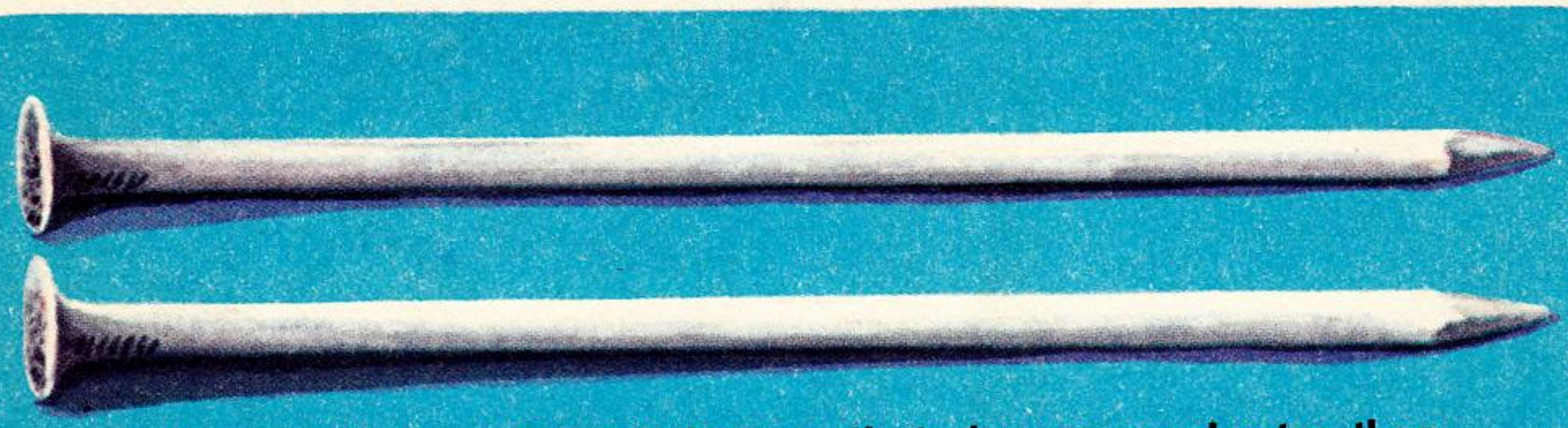
"A ski is longer than a ski-stick. A ski-stick is shorter than a ski. Now you, Daddy."



"A screw-driver is shorter than a hammer. A hammer is longer than a screw-driver. Your turn, Mummy. Think of something."



"Just a minute. Oh, I've got one. A knitting needle is longer than a needle. A needle is shorter than a knitting needle."



You can't say either of these nails is longer or shorter than the other. Both are the same length.
Practise comparing the lengths of different things.

"Isn't it high time you stopped for today?" asked Mummy. "You've been working for ages. You must be tired. Why not go for a walk?"

"But we wanted to see the cartoon about Lyapa the Donkey," cried Olya.

"Oh, I'd forgotten. All right, we'll do that first."



LYAPA THE DONKEY TELLS A STORY



LYAPA: I'm going to tell you a very interesting story. I'm sure you've never heard one like it.



Once upon a time there were three bears, Naf Naf, Nif Nif and Nuf Nuf.

KID: Ha ha! You've got everything all mixed up again, Lyapa. Those are the names of the three little pigs.



LYAPA: Oh, sorry. They were three little pigs. One day a little girl came upon their house in the forest.

KITTEN: You're all mixed up again. It was a wolf that came upon the house in the forest.



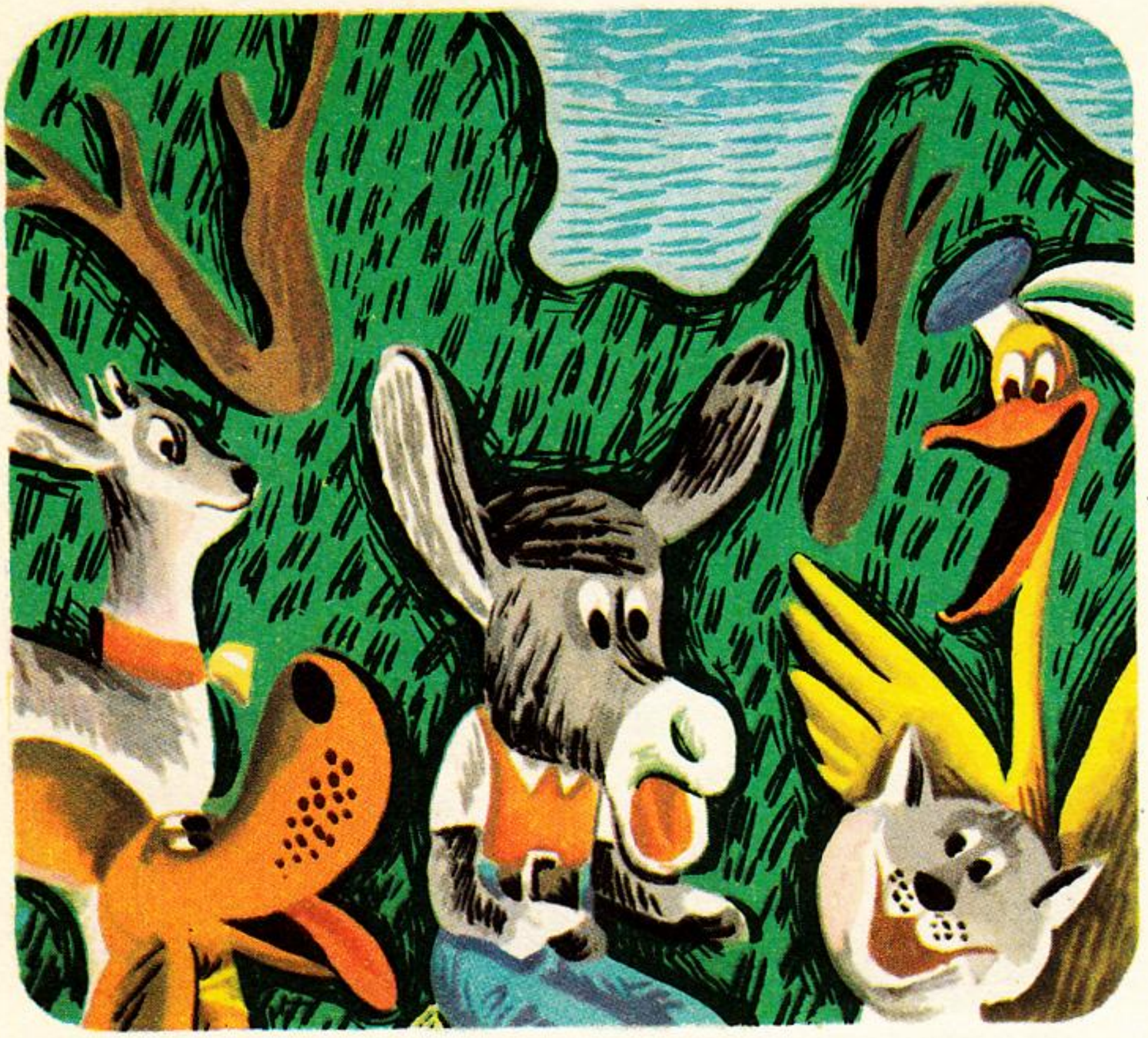
LYAPA: Yes, yes, of course. A wolf. Well, he went into the house, sat down on a chair and broke it.



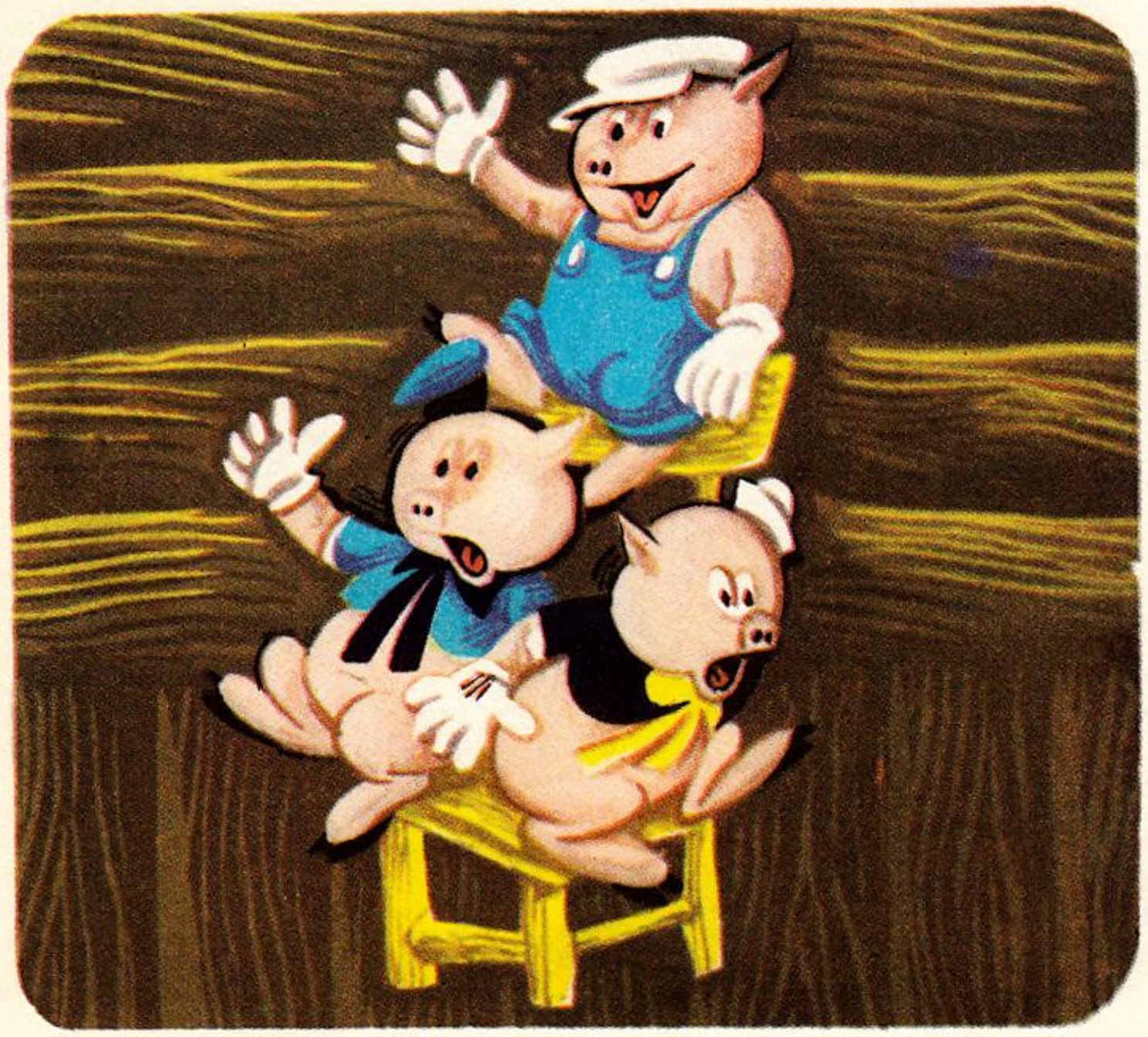
Then he went into the next room and saw two baskets of acorns. He gobbled one of them up. Then, without a moment's thought, he got into bed and fell asleep.



The three little pigs came back home. They saw that there were only two chairs left that hadn't been broken. And they thought and thought — how many unbroken chairs had they had before?

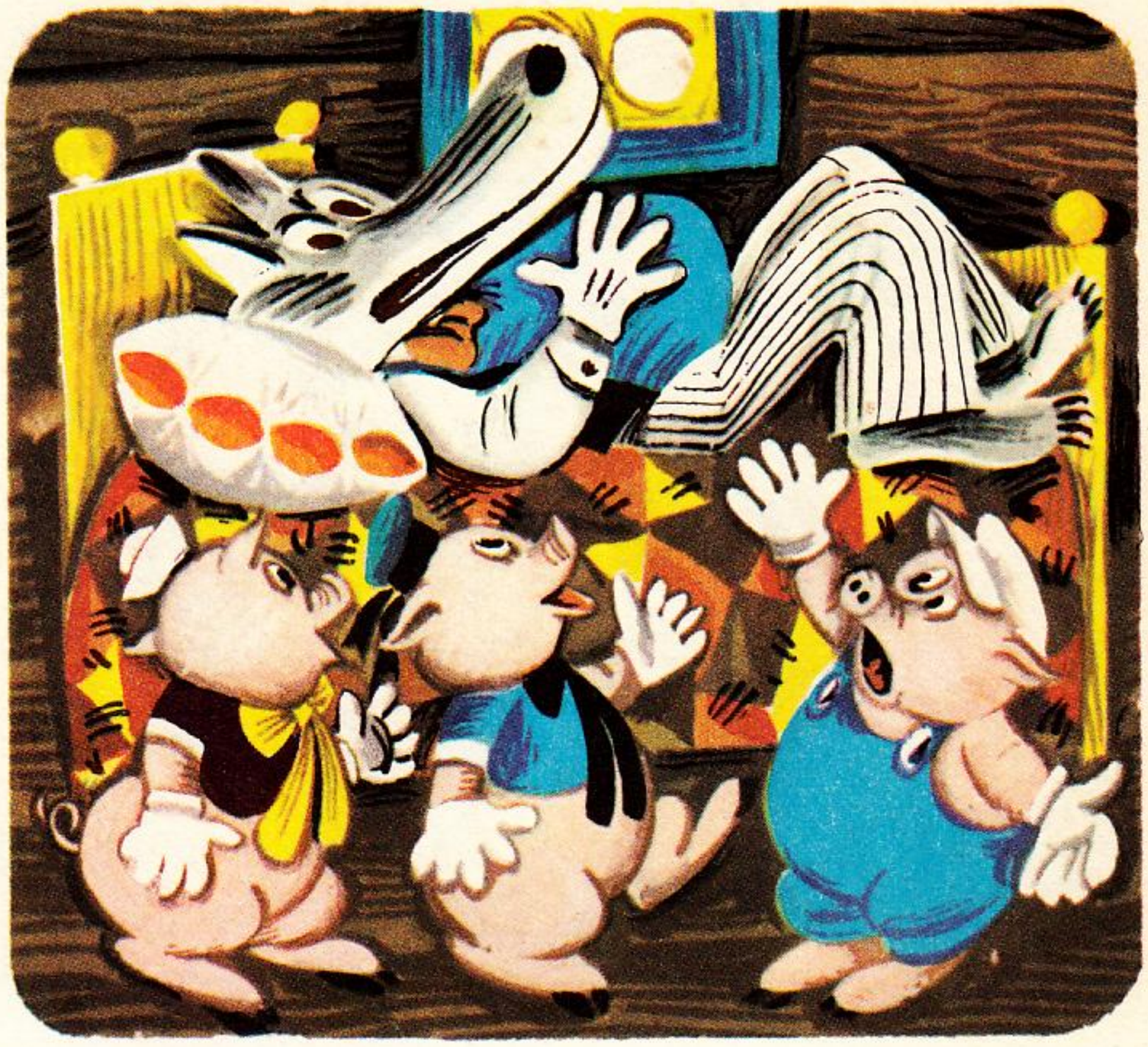


DUCKLING: That can't have taken much thinking about. It's easy. Anyone could tell you the answer. Don't you know it?



LYAPA: Of course I do. There are two chairs that aren't broken and one that is broken. So we have to take away one from two. The answer is one. So the three little pigs only had one chair.

PUPPY: You *are* good at sums, Lyapa. So what happens next in your story?



LYAPA: The pigs went into the next room and woke up the wolf. "Was it you who broke the chairs!" they asked. "Yes," said the wolf. "It was I. And I ate up a basket of acorns." The three little pigs thought and thought. How many baskets of acorns were there left!



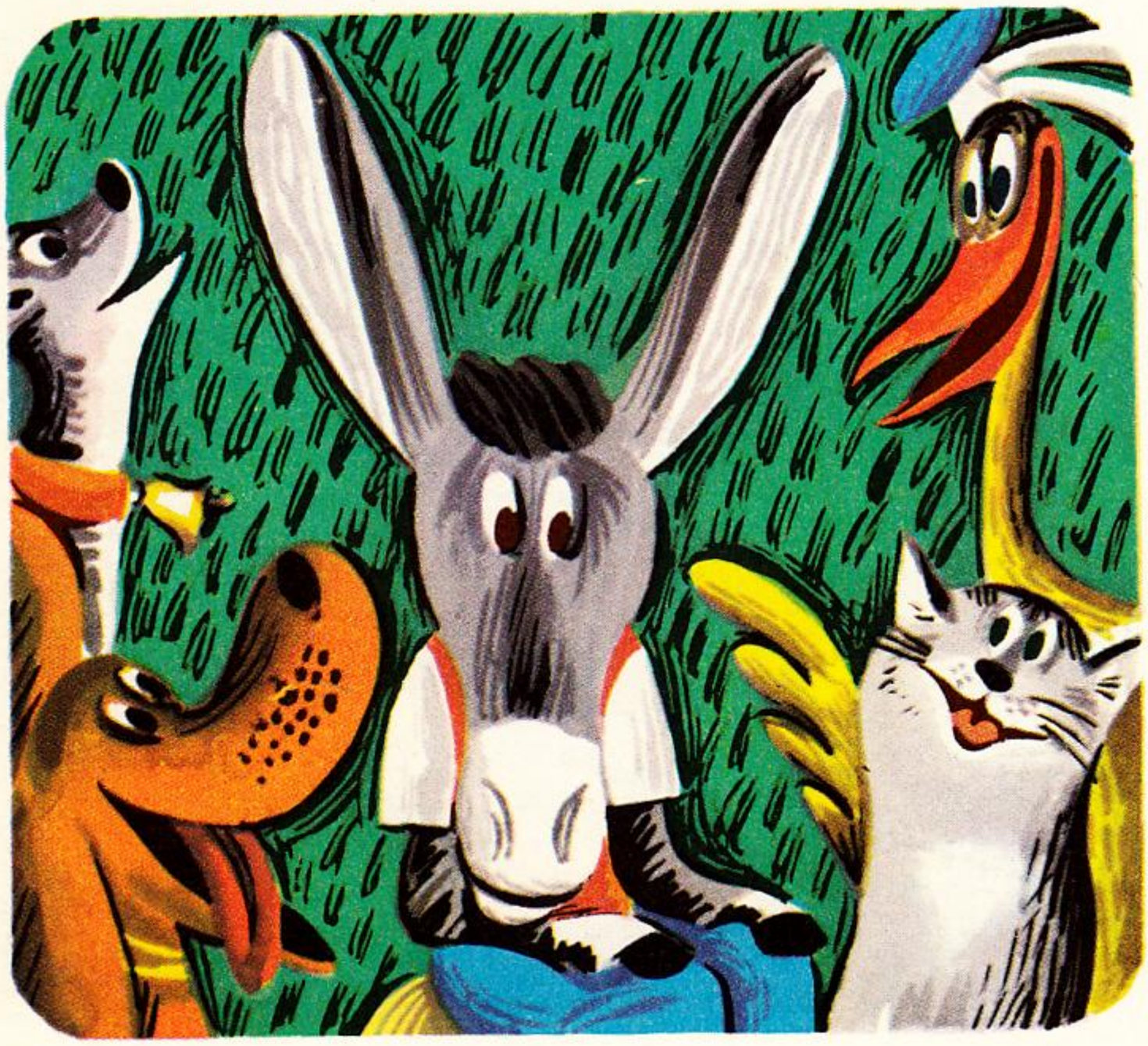
PUPPY: And you know the answer to this one too, do you, Lyapa!

LYAPA: Of course I do. There were two baskets. The wolf ate up one of them. So we have to add one to two. That makes three. The little pigs had three baskets left.



DUCKLING: Yes, it's all quite clear, Lyapa. We can see how good you are at sums. Well, how does the story end?

LYAPA: The three little pigs scolded the wolf for being so naughty and the wolf was frightened and ran away.



KITTEN: Ha ha! What a story! You're quite right. No-one's ever heard one like it.

KID: You can't do sums and you can't tell stories. You get everything all mixed up. My, you have a lot to learn!


The Fourth Notebook

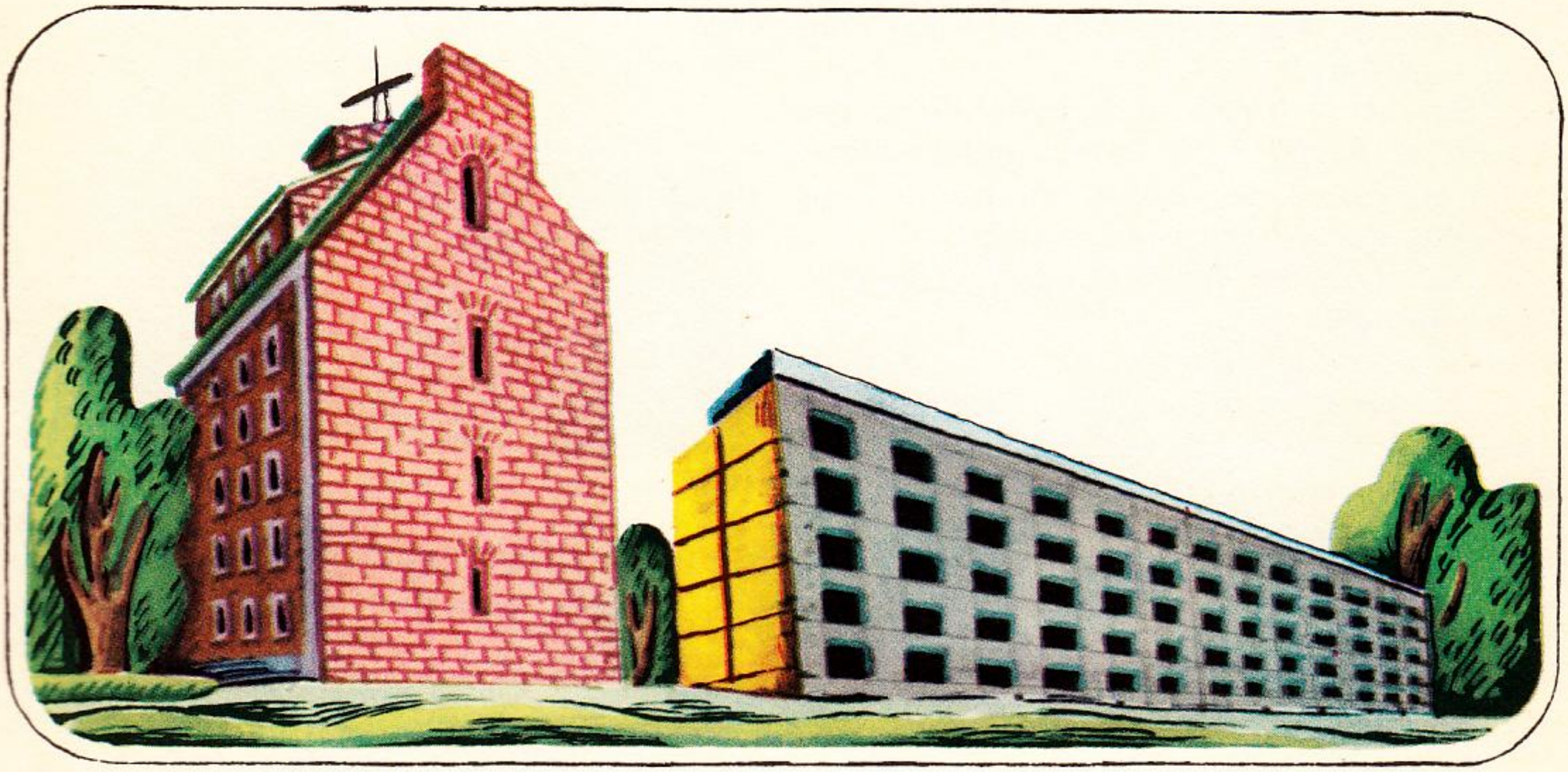
Daddy and Petya were walking along the street. Their street had changed a lot lately. Lots of trees had been planted and lovely new lamps had been fixed to the lamp-posts.

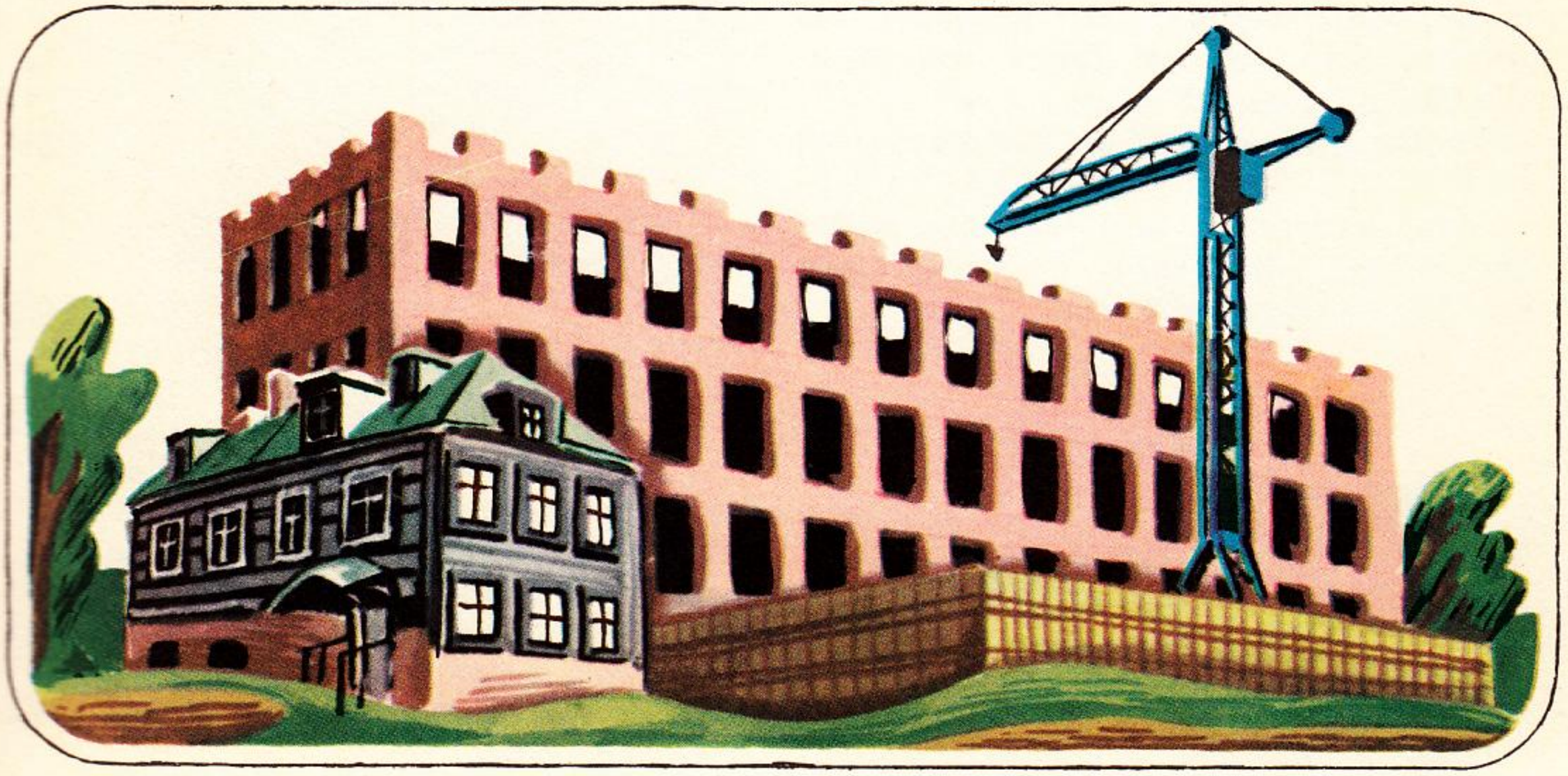
"Look, Daddy! The lamp-post is longer than the tree. The tree is shorter than the lamp-post." Now that Petya knew about comparisons he always tried to do them whenever he had a chance.



"Yes," Daddy agreed. "The only thing is, though, that the word 'longer' isn't quite right here. When you want to talk about things that are upright you should say 'taller'. So the lamp-post is taller than the tree. And, of course, the tree is shorter than the lamp-post. Is that clear?"

"Yes," said Petya. He frowned and added, "are we upright, Daddy?"





"We are indeed. And, as you're not very tall yet, for the time being...."

"Daddy is taller than Petya and Petya is shorter than Daddy," finished Petya. He looked about him. "Is there anything else we can compare!"

"You could try those two buildings over there. The brick one and the big block of flats."

"The brick building is taller than the block of flats," said Petya immediately.

"Very good. So you've compared their heights. But what about length!"

"The block of flats is longer than the brick building."

"Good... So the brick building is taller but shorter than the block of flats and the block of flats is lower but longer than the brick building. Clear!"

"Yes. Look at those houses, Daddy. The pink one is taller *and* longer than the grey one."

"So it is."

"Are there any other ways you can compare things!" Petya asked.

"Lots of ways. There's 'wider' and 'narrower', for instance. The pavement is narrower than the road. The road is wider than the pavement."

"Is the lawn wider than the pavement too!"

"Yes. And some buildings are wider than others. The shop is wider than the block of flats next door."



"Why has the shop got a two on it!" Petya wanted to know.

"That tells you where it comes on the street. I told you houses have numbers. I wonder what number the block of flats is. Four ... you don't know four yet, do you! Try to remember it."



You remember number four too. Write some fours in your notebook.

"But why is number four next to number two!" Petya asked. "Where's number three! Has it got lost!"

"No," smiled Daddy. "It isn't lost. It's across the street."

"Why!"

"You can see for yourself. If all the houses on one side of the street were numbered one after the other, there wouldn't be any numbers left for the houses on the other side. So people decided to give the houses on one side numbers like one and three and the ones on the other side numbers like two and four. And so on."

"What does 'and so on' mean!"

"It means that when you see a number you can always tell what the next one will be. If the first number is one and the next is three, then the one after that must be five. The house after number two is number four and the one after that is number six."

"What comes after number a hundred!"

"Number a hundred and two. But it would have to be a very long street."

"What side of the street would number a hundred and two be on!" asked Petya.

"On this side," said Daddy.

Petya pulled at his hand. "Let's go and see if there's a number a hundred and two on our street."

"No," said Daddy. "Don't hurry. You haven't got used to four yet. Look at it carefully and remember how it's written."

Petya looked but only for a moment. "I've got it. Now let's do sums with four. Give me one."

"No," Daddy said again.

Petya was very surprised. Wasn't Daddy going to teach him anymore! But before he had time to say anything, Daddy went on, "We've a sum to do already. Mummy's asked us to buy some stools."

"But she's bought two new stools today already."

"True. But two stools aren't enough for our family. How many of us are there!"

"Four," said Petya. "You, me, Mummy and Olya."

Can you count how many people there are in your family!

"And," said Daddy, "we need one stool each. How many does that make!"

"Four."

"So here's your sum. We need four stools. We've got two already. How many do we still have to buy!"

Now you work it out.



"Let me think," said Petya. "Two. The answer is two."

"That's right. Now tell me how you got there."

"I imagined two stools. Then I imagined two people sitting down. How many people were left standing? Four take away two leaves two. Minus, I mean. Four minus two leaves two."

"You'd better write that," Daddy said. "But we haven't got a notebook with us. What shall we do?"

Petya looked first left, then right. Then he saw a sandy path. "I know," he cried. "I can write with a stick in the sand."

They found a stick, and here's what Petya wrote:



What is Petya to do without his notebook? Take your notebook and write down the answer to his sum.

Read it out loud. Is your answer the same as his?

Daddy was pleased that Petya's answer was right. "Come on," he said. "Now we have to do the job Mummy asked us to do."

Petya took Daddy's hand and they set off towards the furniture shop.

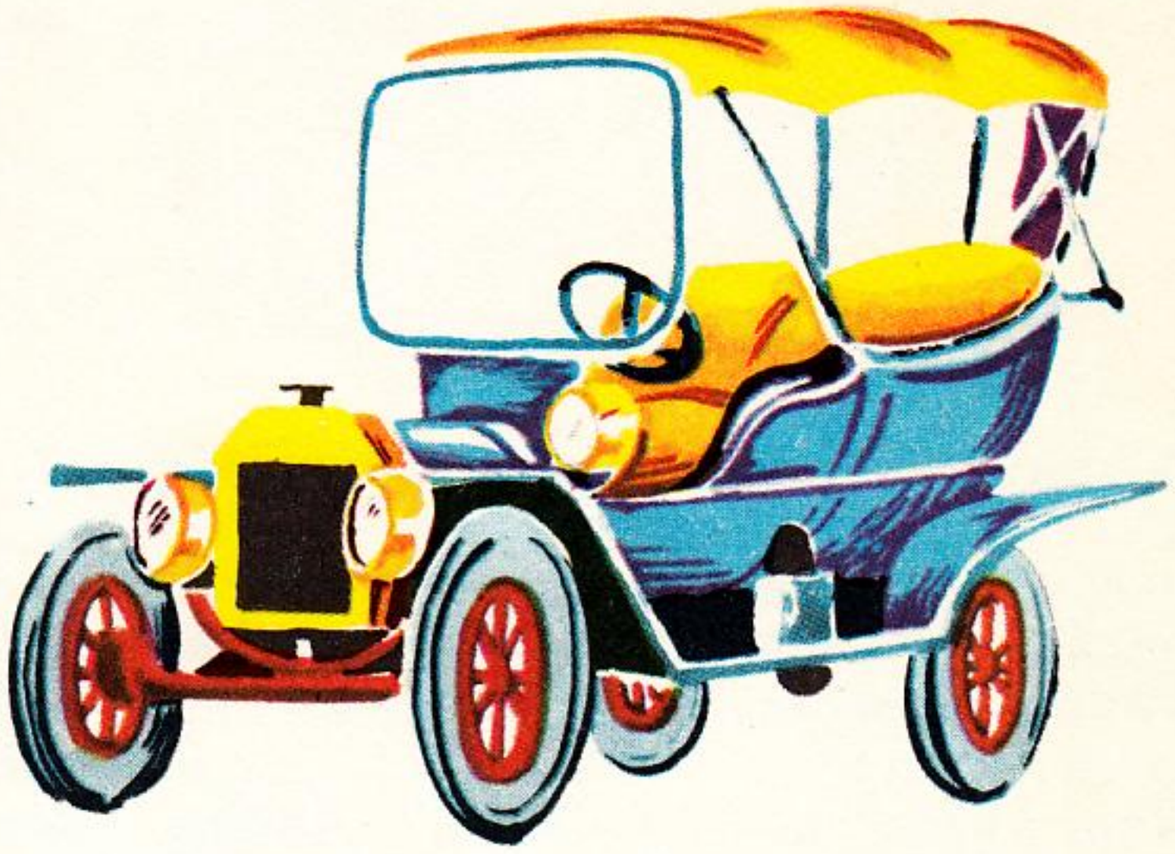
"Why didn't Mummy buy four stools this morning?" asked Petya.

"Would you like poor Mummy to have to carry four stools at once? They're very heavy and very cumbersome. Carrying furniture is a man's job."

They bought the stools and then went home. On the way back Petya kept looking out for things that come in fours. He pointed out that



a stool has four legs;



a car has four wheels;



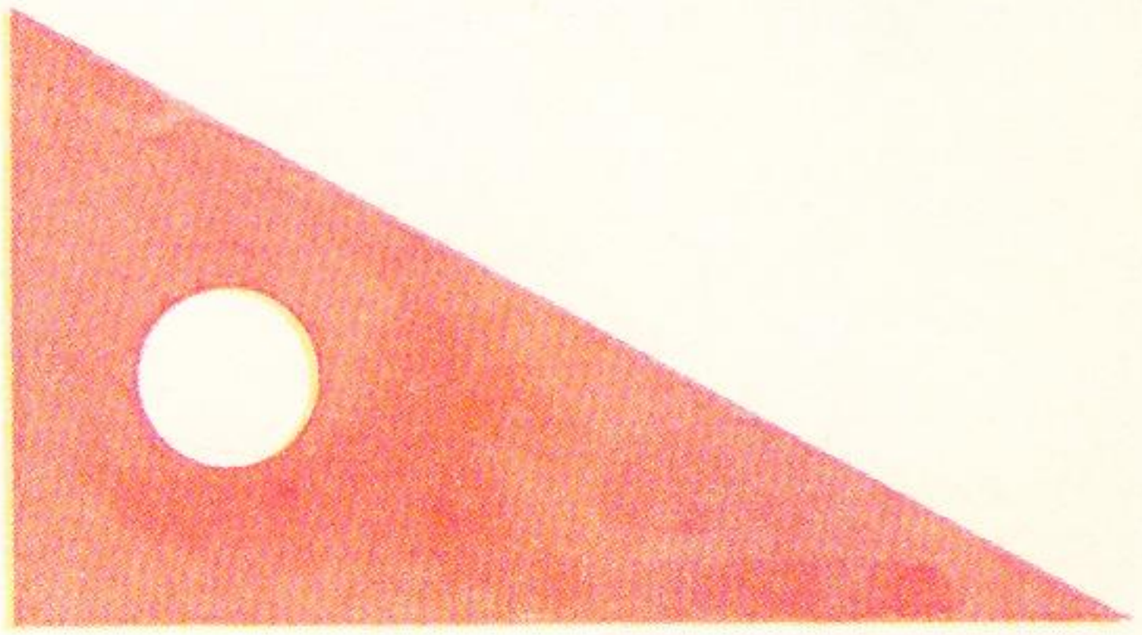


cats and dogs have four paws each.

Now you make a list of things that come in fours.

"It's a shape that has four sides and four angles," said Mummy.

Just then Olya ran up to the desk, took something from it and rushed over to Petya. "Here's a four-angle!" she cried.



Petya was hardly inside the door when he cried, "Mummy, we've done the sum about four!"

"Four whats!" asked Mummy, mystified.

"We've bought two more stools."

"Good!" said Mummy. "But what makes you think that's a sum about four!"

"We needed four stools. We had two already. So Daddy and I worked out how many more to buy."

"Can you write four now!" asked Mummy.

"Yes. Daddy showed it to me on a house and then I wrote it with a stick in the sand."

"Very good. But you must practise in your notebook too. Write some more fours," said Mummy. She turned to Daddy. "Have you shown Petya a quadrilateral!"

"No. I've left that to you."

"What's a quadrilateral, Mummy!" asked Petya.

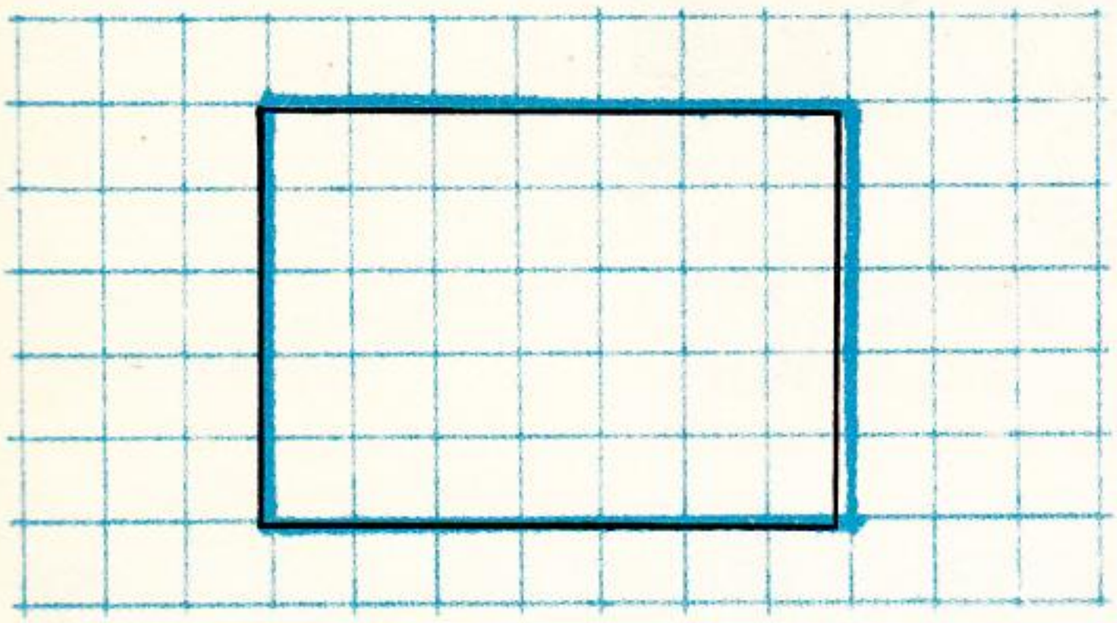
"Don't interrupt when grown-ups are talking, Olya," Petya said gravely. "Especially when they're talking about maths. Besides, look what you've brought. How many angles has it got! Count them. One, two, three. It's a three-angle. That's how good at maths you are!"

Olya looked at Mummy in dismay, and Mummy patted Olya's head. Then she said to Petya, "You're too hard on her. She understood the question was about a shape with angles. Only she didn't see that this shape only has three angles, not four. By the way, Petya, it's called a triangle, not a three-angle."

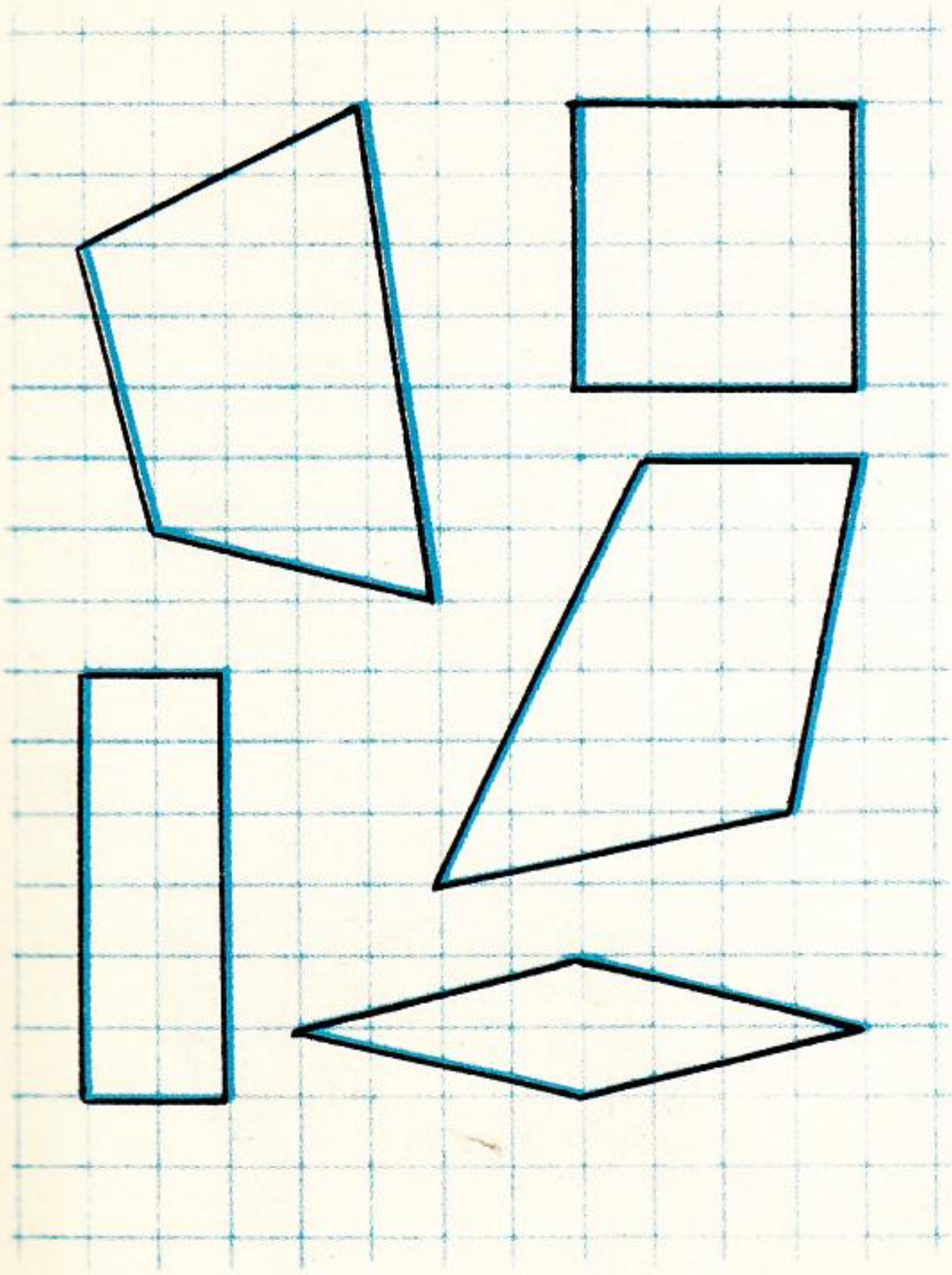
Petya was ashamed. "I'm sorry, Olya," he said. "Now let's look at quadri.... quadri....."

"Quadrilaterals. That means four-sided. There's one right in front of you. Look at the table. If you run your finger along the edge you'll be outlining a four-sided

shape. Get your notebook and draw one in it.



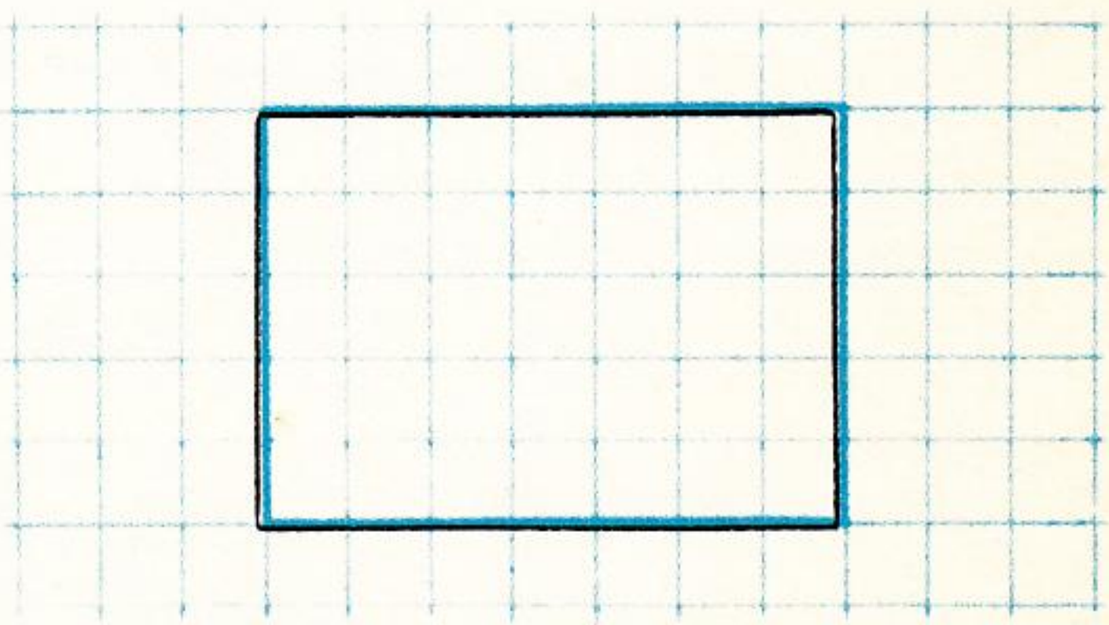
Now we can draw some other quadrilaterals.



Look. Each has four angles, four sides, four corners. Take the ruler. You can draw all sorts of differently shaped quadrilaterals."

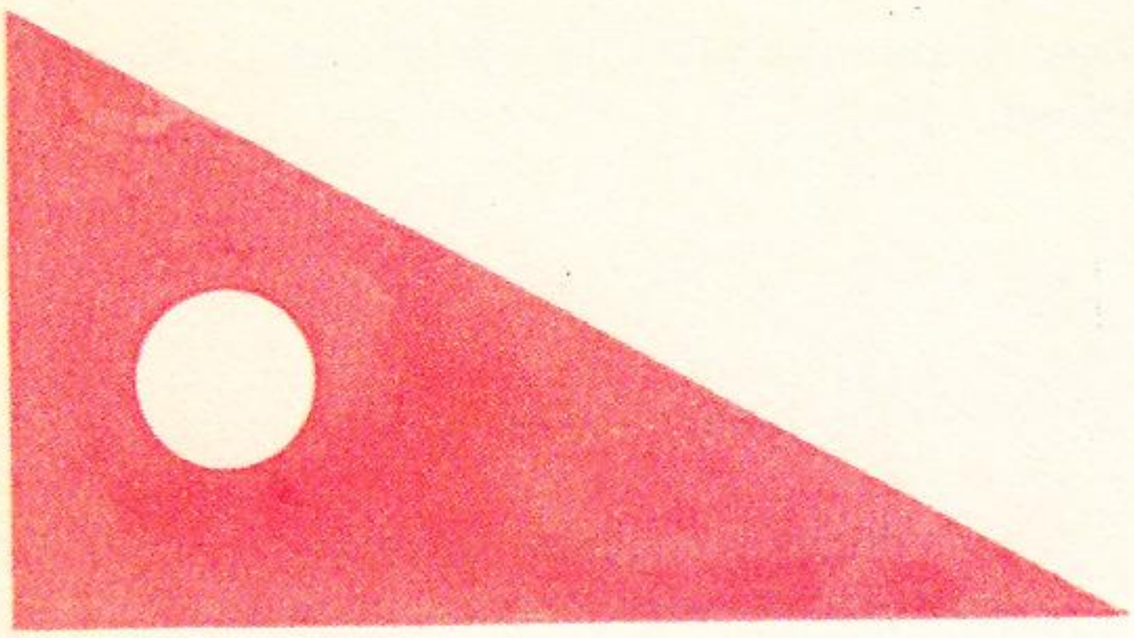
Now you take a ruler and draw some quadrilaterals like Petya's in your notebook. Show the corners, angles and sides clearly.

Petya drew lots of quadrilaterals. The best was the one that looked most like the quadrilateral Mummy had drawn first. Petya showed it to her proudly.



"Look! I've drawn it along the squares in my book. See how neat it is!"

"This sort of quadrilateral has a special name," said Mummy. "It's called a rectangle. All its angles are right angles. But you've drawn a right angle already. Olya, pass the triangle over here.



"Petya, show where the right angle is."

You say where
the right angle is.

"Now," said Mummy, "let's look round and see how many rectangular things we can find."

"The door," said Petya. "The window."



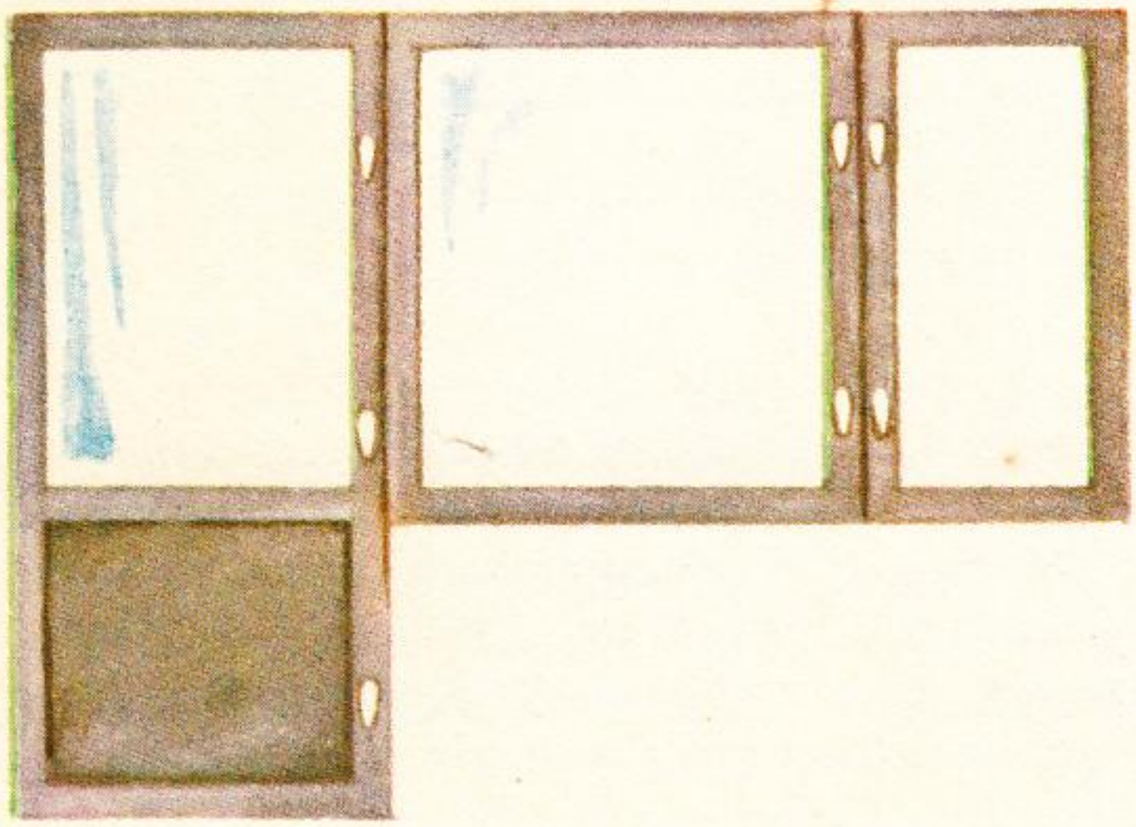
"The book," said Olya shyly.

"That's right. Now let's have a look round the house and see how many other rectangles there are."

Now you make
a list of things
that are rectangular
in your house.

Petya took a matchbox in the kitchen and showed three different rectangles.

"Yes, that's right," Mummy agreed. "But keep away from matches. Put the matchbox back."

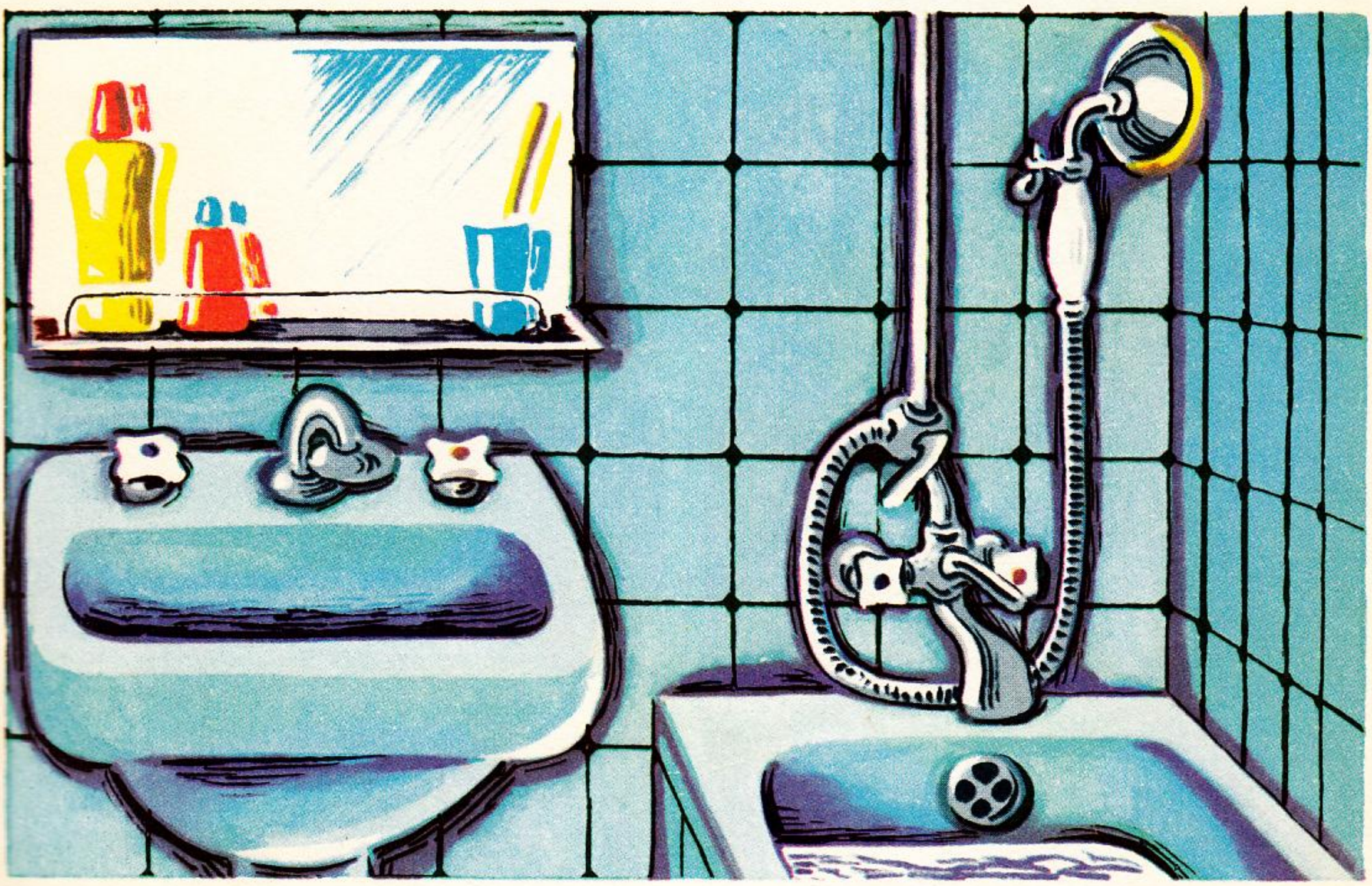




In the bathroom Petya looked at the wall. "Oh, there are masses of rectangles in here. The walls are all covered with them."

"Those are tiles," said Mummy. "Each of them is a rectangle. But it's a special sort of rectangle. All the sides are the same length. That sort of rectangle is called a square."

That sort of rectangle is called a square.



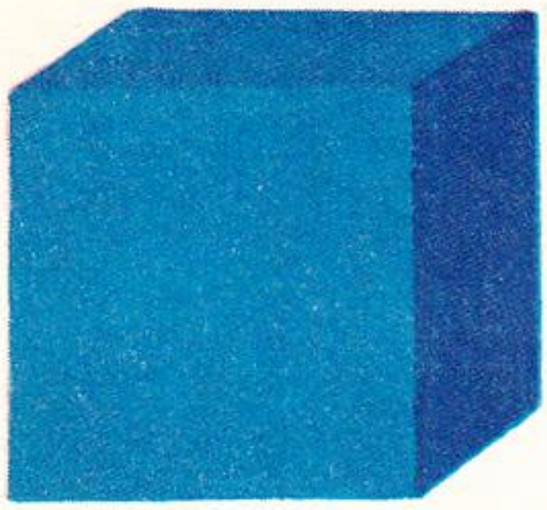
"Why, Daddy showed me a square in my tool set," Petya exclaimed.

"Is this a square?" Olya wanted to know. She pointed at the mirror over the basin.

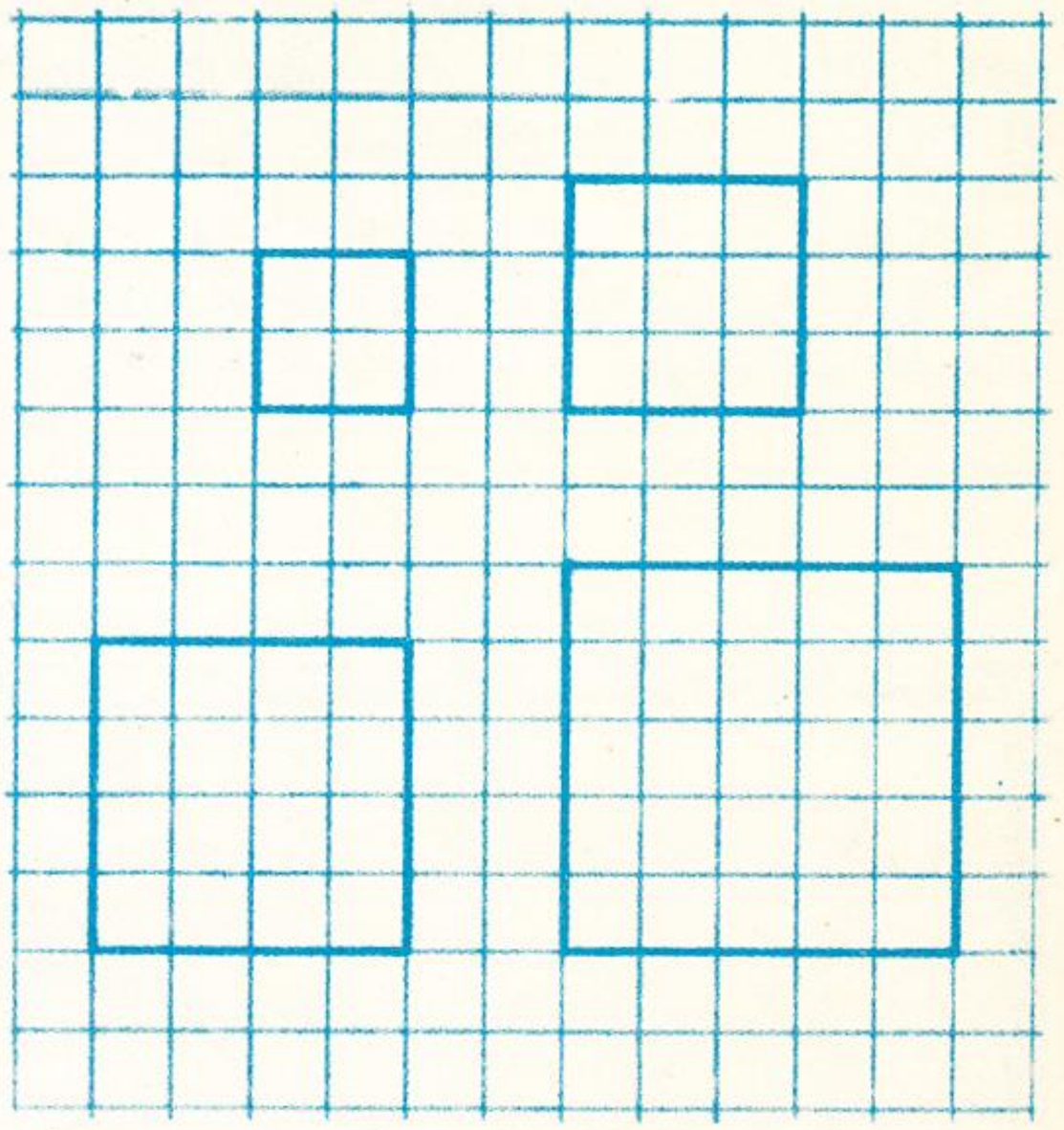
"No, darling. It's a rectangle, but it's not square."

Explain why the mirror over the wash basin isn't a square.

But Olya really did want to find a square. "Is this one!" she asked, holding one of Petya's building blocks.



Mummy smiled. "That's right. Each side of the block is a square."



Now you take a building block and point out the squares on it.

Now you draw lots of different-sized squares in your notebook.

"And every little tiny square in my notebook is a square," said Petya eagerly. He wanted to be the centre of attention again.

"Of course," said Mummy. "And the little tiny squares can be joined up to make bigger ones. Let's draw some different-sized squares in your notebook."



EXERCISES EXERCISES

1. Name these numbers:

3 4

2. Give the answer:

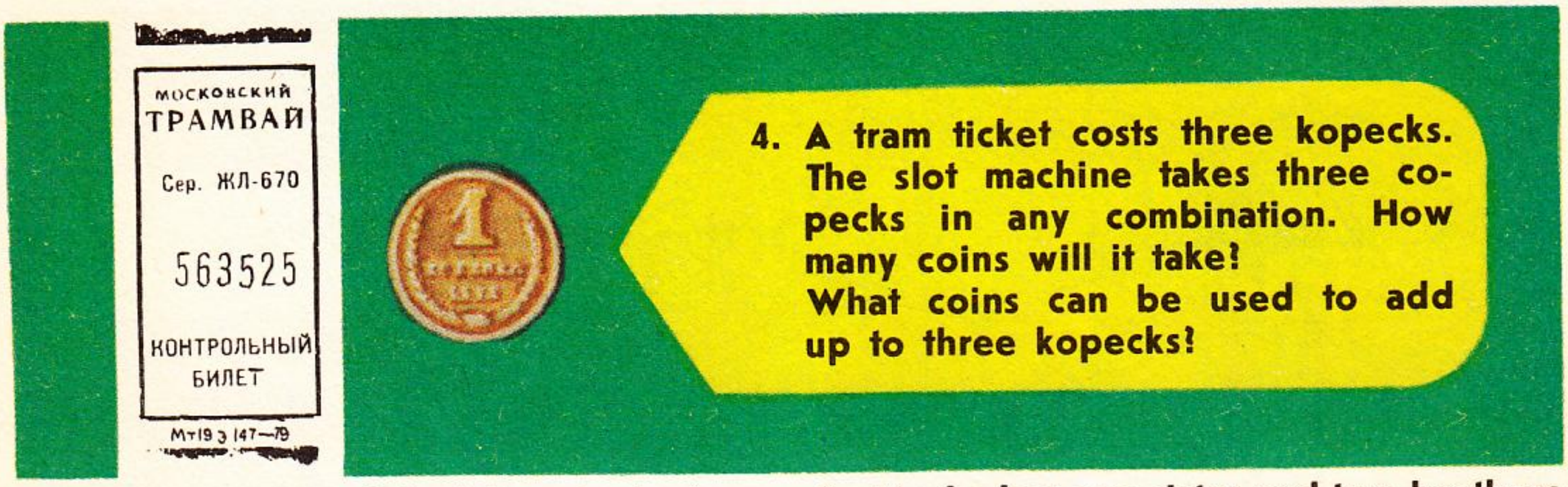
1 + 2 =
2 + 1 =
1 + 3 =
3 + 1 =
2 + 2 =
3 + 0 =
0 + 3 =
4 + 0 =
0 + 4 =

3. Give the answer:

3 − 0 =
3 − 1 =
3 − 2 =
3 − 3 =
4 − 0 =
4 − 1 =
4 − 2 =
4 − 3 =
4 − 4 =

EXERCICES EXERCICES

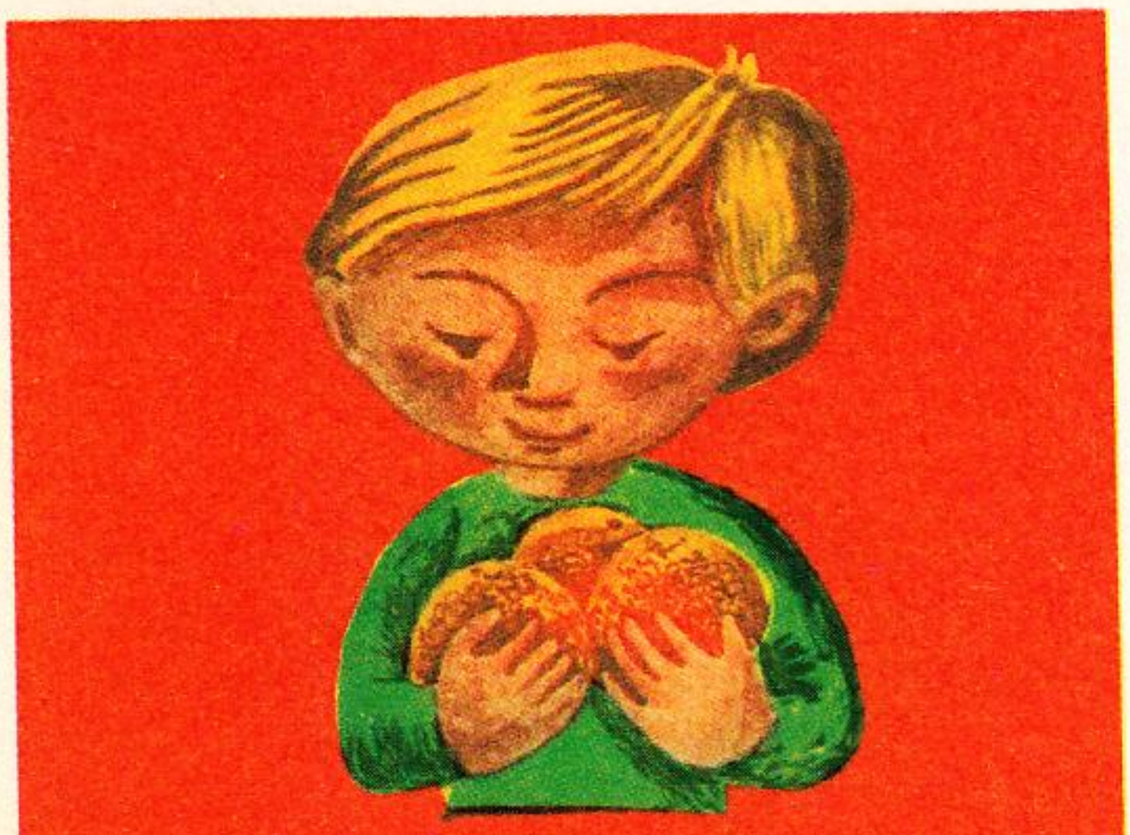




4. A tram ticket costs three kopecks. The slot machine takes three copecks in any combination. How many coins will it take? What coins can be used to add up to three kopecks?

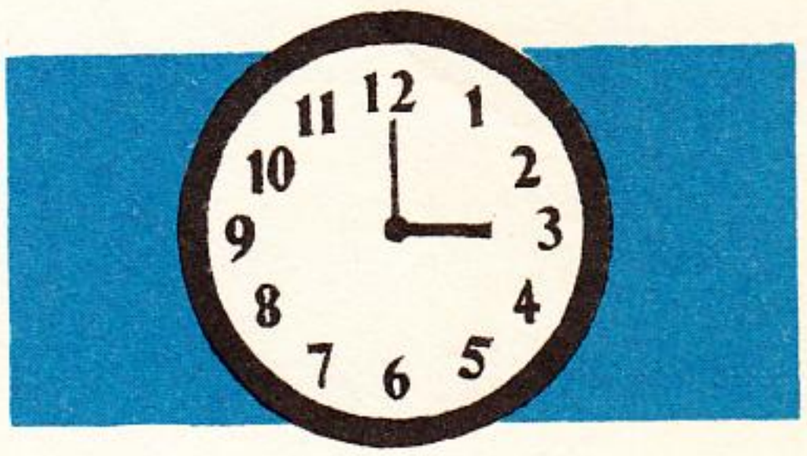
5. The new school building is to have four storeys. The builders have already finished two. How many storeys still have to be built?

6. Masha has one sister and two brothers. How many children are there in the family altogether? How many of them are girls?

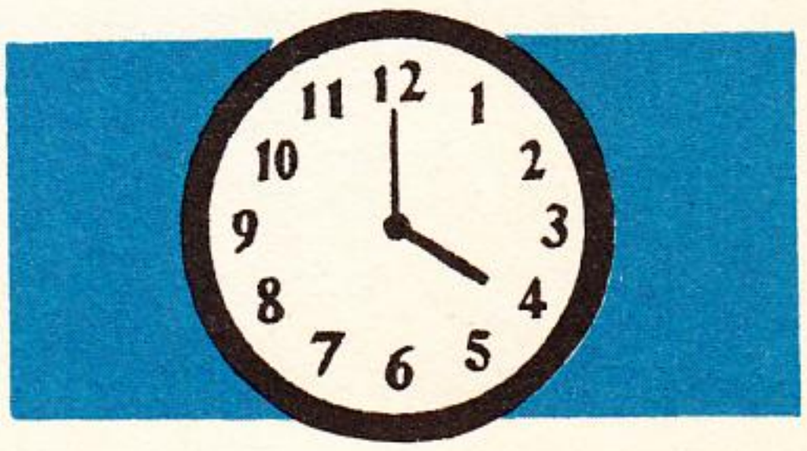


7. Dima had three oranges. He gave Mummy and Granny one orange each and ate one himself. How many oranges were left?

8. What is the time by this clock?



Notice that the hands make a right angle.

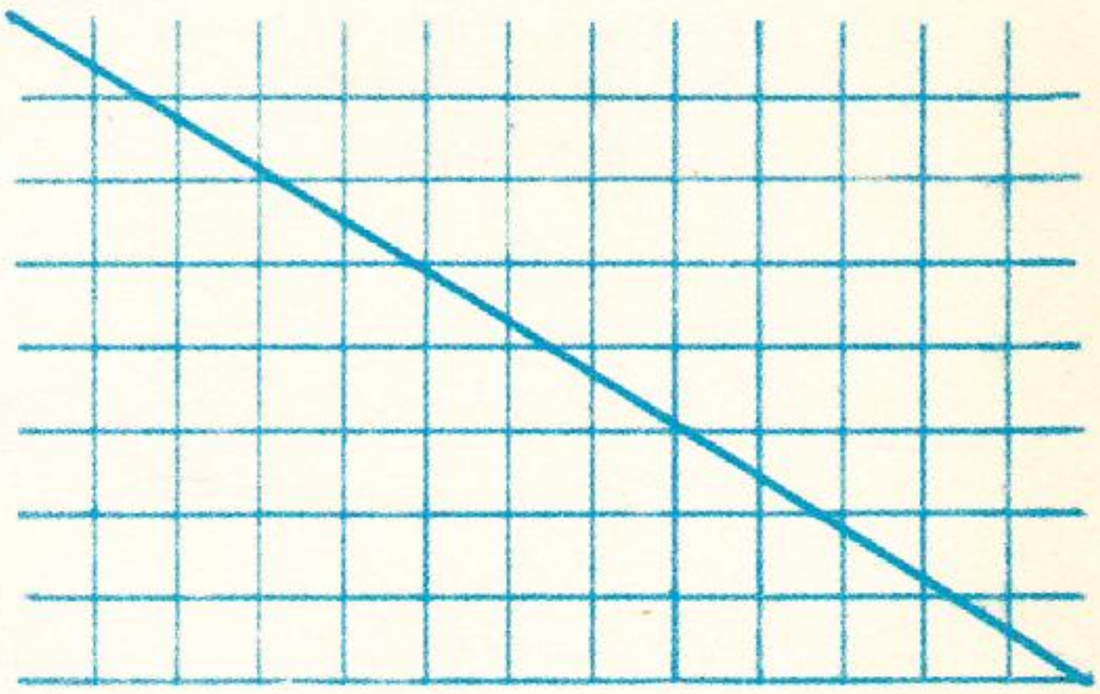


What is the time by this watch?

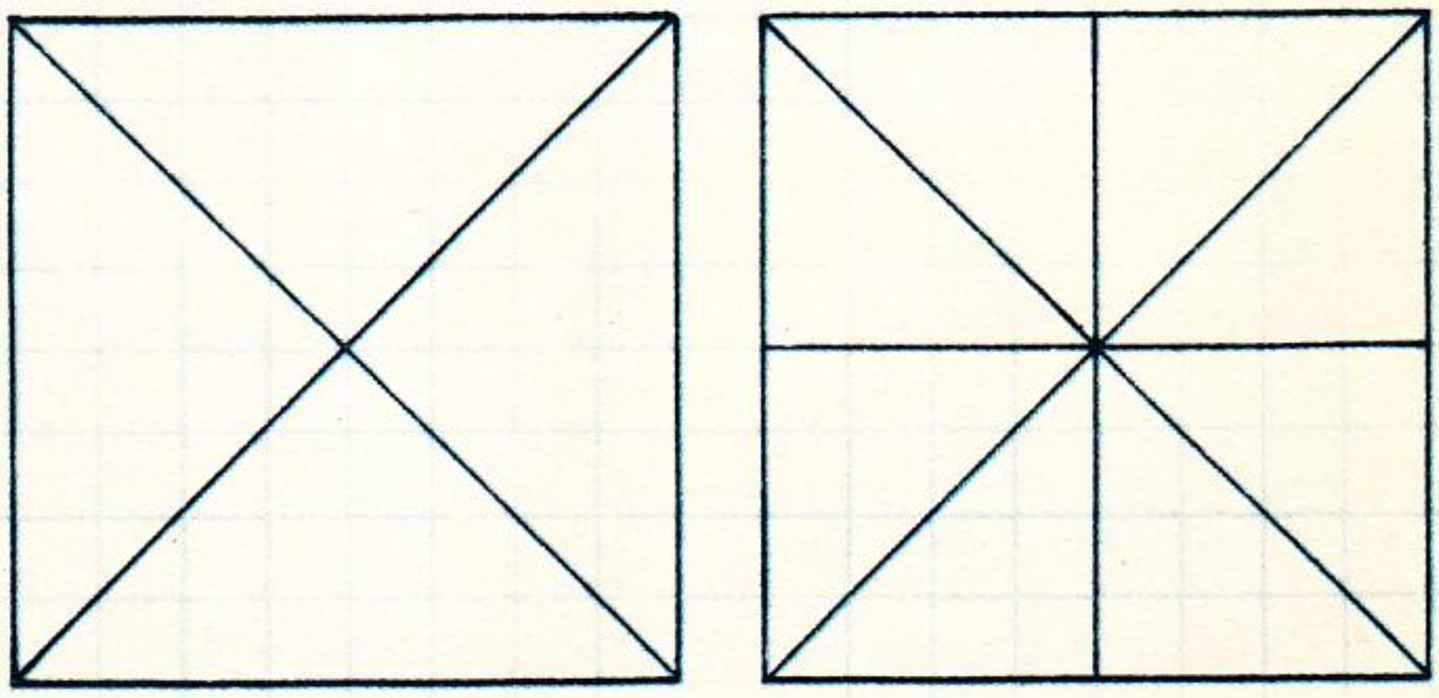
EXERCICES EXERCICES



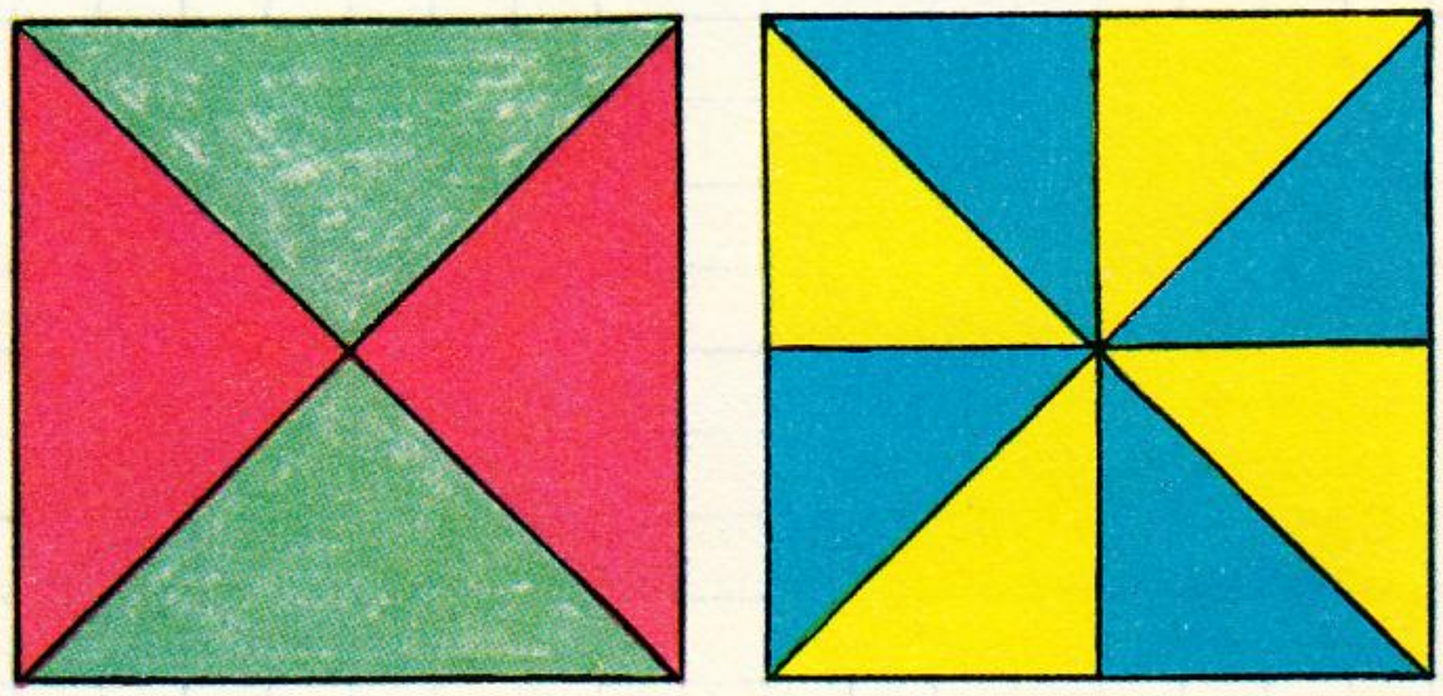
9. Cut a rectangle out of squared paper and draw a line across it like this. Now cut the rectangle in two along this line. You now have two triangles. Put one on top of the other to see if they are the same size.



10. Draw two squares. Now draw lines across them like this.

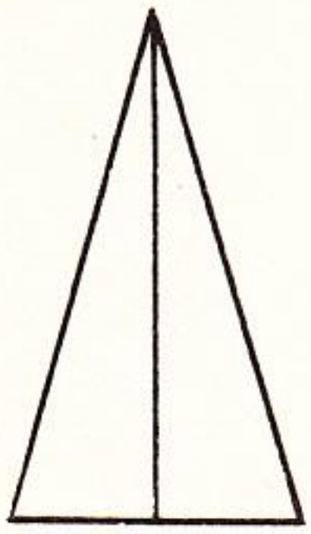


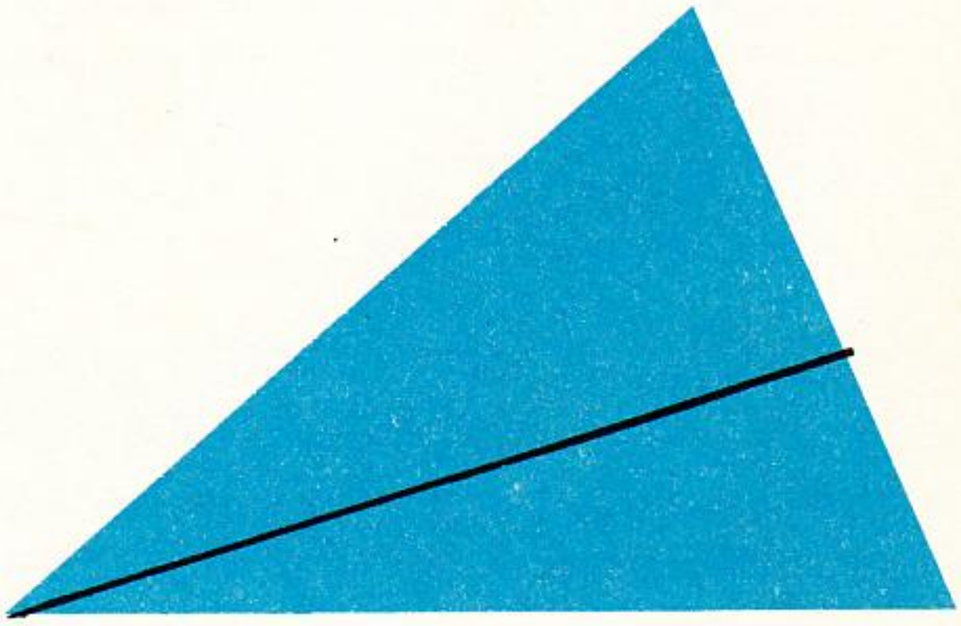
Colour in the shapes, like this, using two colours.



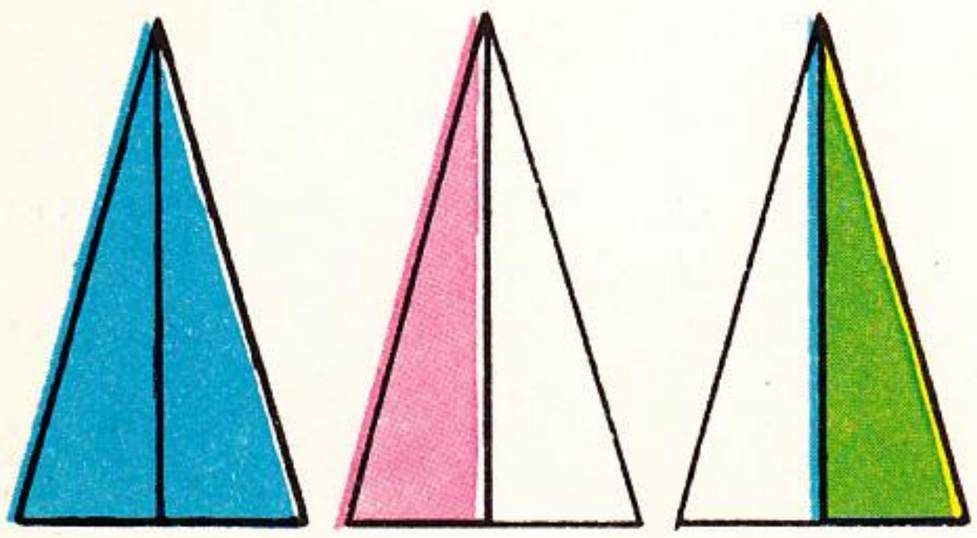
EXERCISES EXERCISES

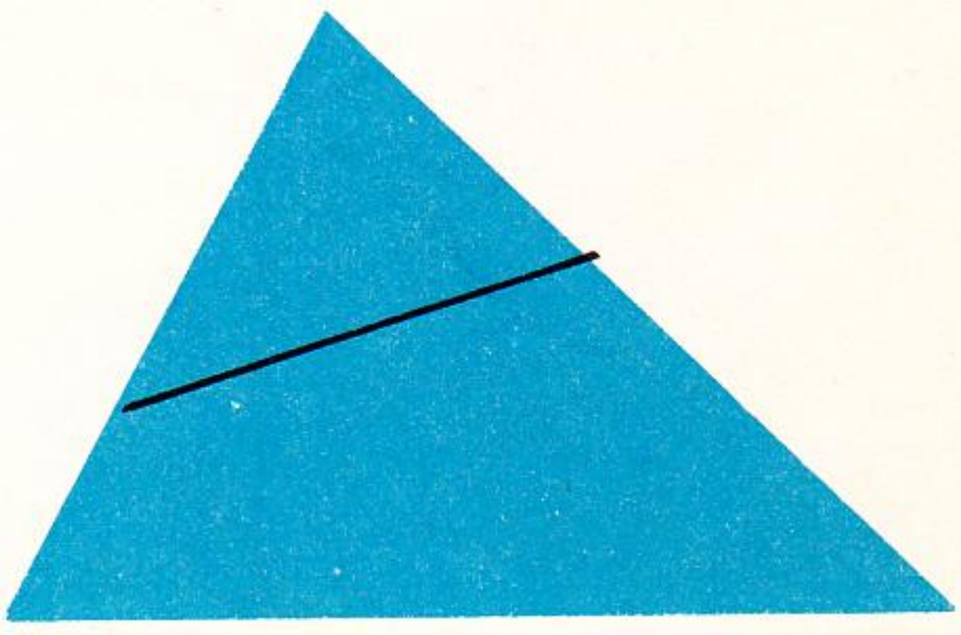
11. There are three triangles hidden in this drawing. Find them.





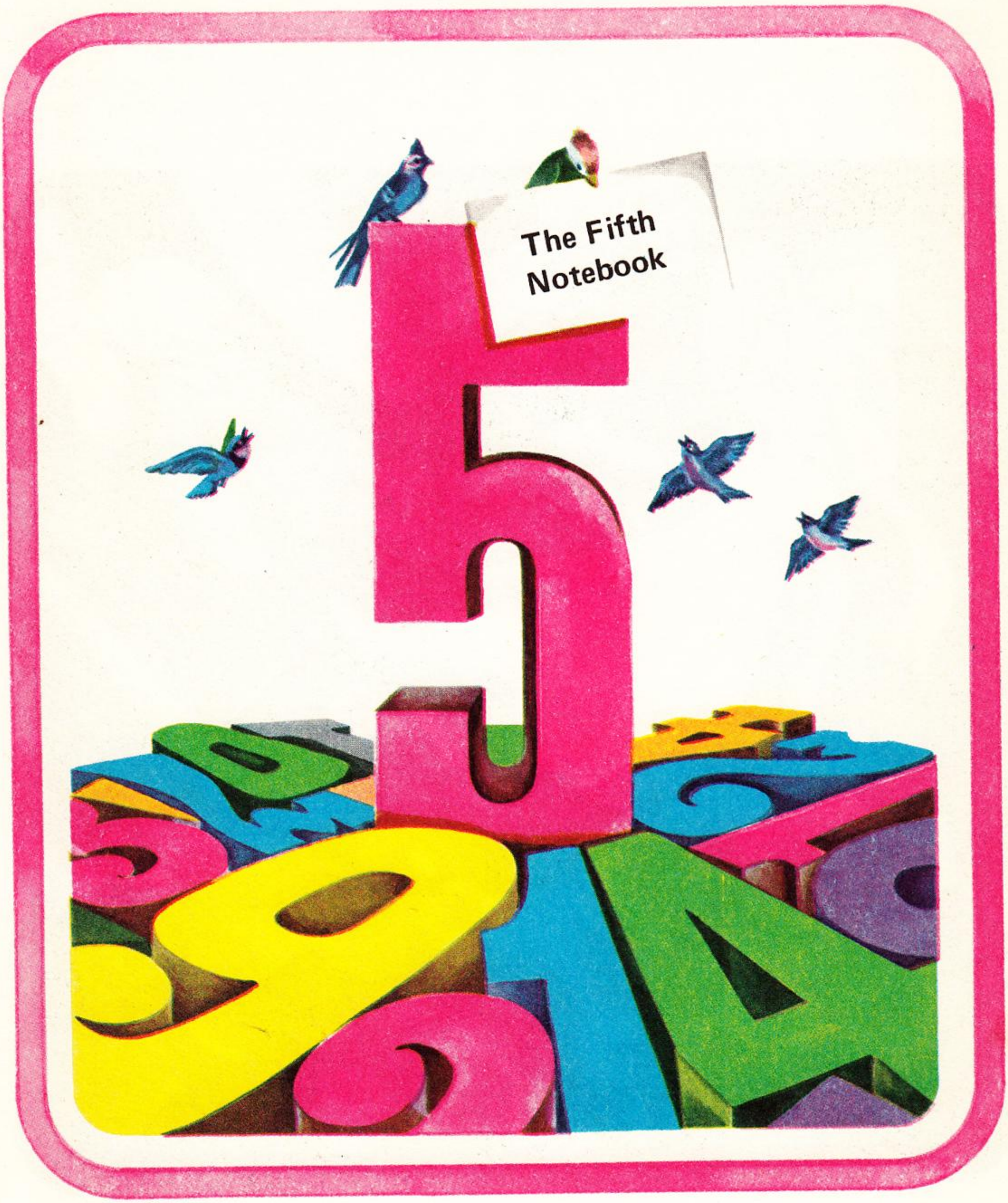
Here they are, coloured in with different colours.





12. Cut out two triangles from some paper. Draw a line through the angle of one of them. What will you have if you cut the triangle along this line? Now draw a line outside the angle, like this.
Cut the triangle along this line. What will you have then?

13. What is the name of the third day of the week?
The third month of the year?
What is the name of the fourth day of the week?
The fourth month of the year?
14. Name the four seasons.


The Fifth
Notebook

Petya and Olya could hardly wait till Sunday. Uncle Misha, Mummy's brother, had promised to come in his car and take them all to the country. Uncle Misha was a pilot. The children loved listening to his stories about the places he had been to and always looked forward to seeing him. They started preparing for the excursion on Saturday evening. They put out lots of toys in the hall.



When he saw them, Daddy laughed. "You've overdone it, children. Uncle Misha's car is only a mini, not a five-ton truck. You may leave a bucket and spade for Olya and two racquets and a shuttlecock for Petya."

So the rest of the toys had to be taken back to the children's room.

Olya touched each one in turn and began to count slowly:

"One, two, three, four, five. Five toys."

"What a good girl you are, Olya!" Petya went on in the same voice. "And now, here's a sum for you. Petya and Olya



"How many toys are there in the hall now? Can you count them, Olya?" asked Petya, trying to sound like Daddy.

are going to take five toys to the country. Two of the toys are Olya's. How many of them belong to Petya?"

Can you count the toys the children are taking to the country with them?

Can you answer Petya's question?

Olya looked at Petya speechless and didn't dare answer. Petya decided to help her.

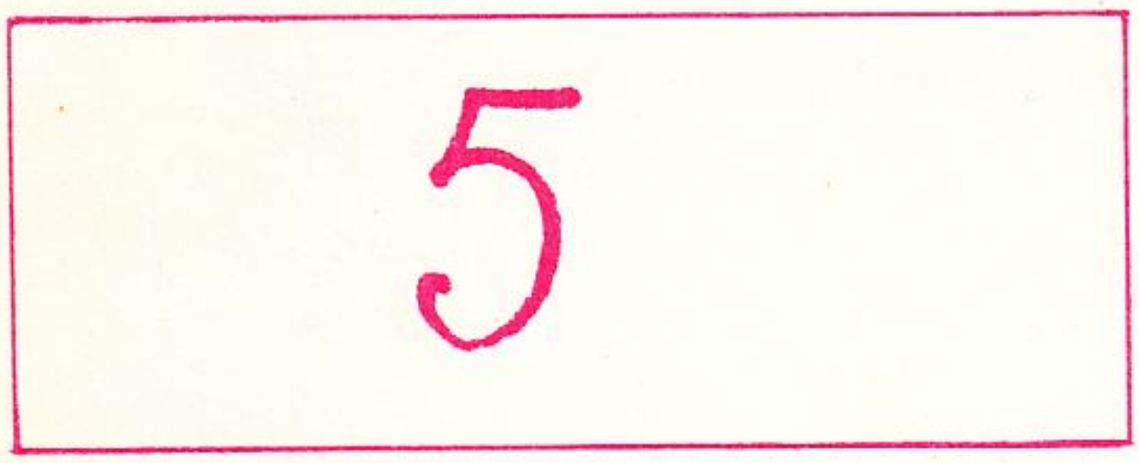
"Well, what's up? Look at the toys in the hall. There are five altogether. Take away your bucket and spade. How many does that leave? It's easy."

"Three," said Olya happily. "Will you write down the answer in your notebook?" she asked.

Petya opened his notebook. Then he hesitated. He didn't know how to write a five.

"Please show me how to write a five, Daddy," he called.

"Here it is."



Now you take your notebook and write some fives in it.

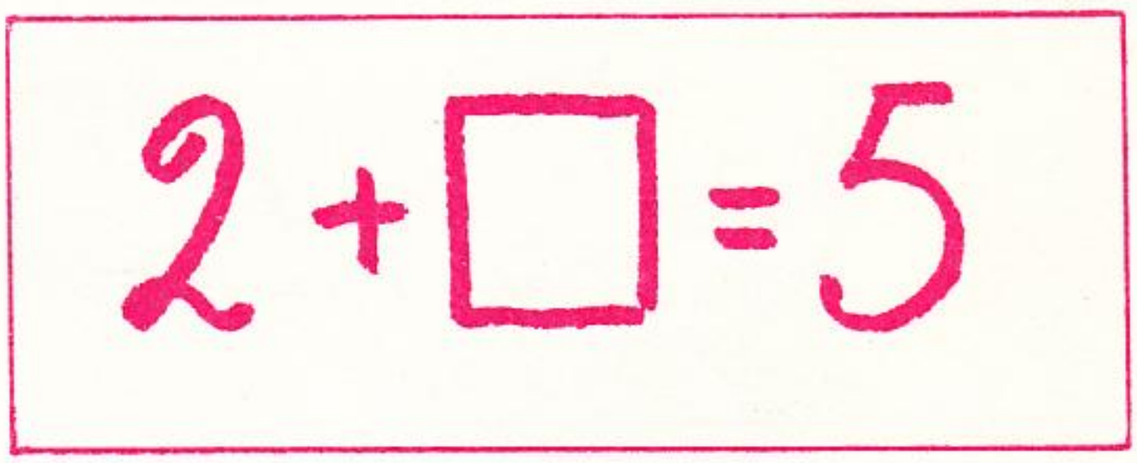
"What d'you need a five for?" Daddy asked.

"We want to write down the answer," Olya explained. "Petya made up a sum and I did it."

"What sort of sum?" asked Daddy.

"We're taking five toys with us. Two of them are mine. How many belong to Petya?"

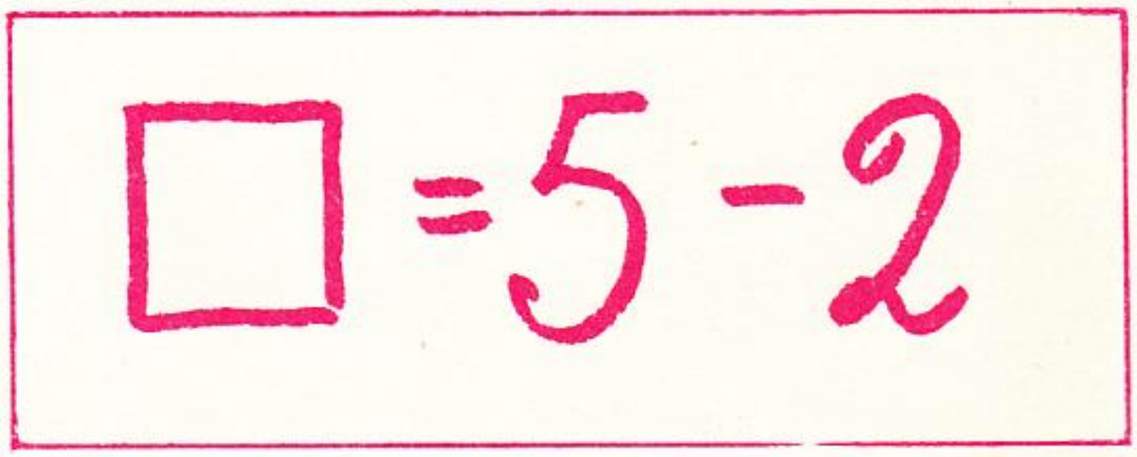
"All right. Let's write down the answer. First of all, though, we've got to write the question. There's a special sign you can use for it. We know that if we add Petya's toys to the two belonging to Olya there'll be five altogether. You can write it like this:



You see, we don't know how many toys Petya has yet, so instead of the unknown number we write a small square. That tells us that we want to know what number has to be added to two to make five. Now, how do we find the unknown number?"

"I know!" cried Petya. "We've got to take away two from five."

"That's right. We'll write it like this:



What does five minus two leave?"

"Three," said Petya.

Daddy nodded. "So here's the last step."

5-2=3

Write all the steps
Daddy explained to Petya
in your notebook.

unknown number! It makes it much easier to find out what the number is." He was so thrilled that he danced round the room with Olya.

Mummy came in. "Aren't you making a lot of noise! I know unknown numbers are exciting, but it's time for bed. Come on, Olya."

"Let's do a bit more, Daddy," pleaded Petya. "Let's find one more answer like the last one, with a little square."

"Very well. But only one. Here's the question. A car pulled up outside a house. Four people got out leaving one still inside. How many people were in the car when it arrived?"

Petya was delighted. "What a good idea it is to put a square instead of the

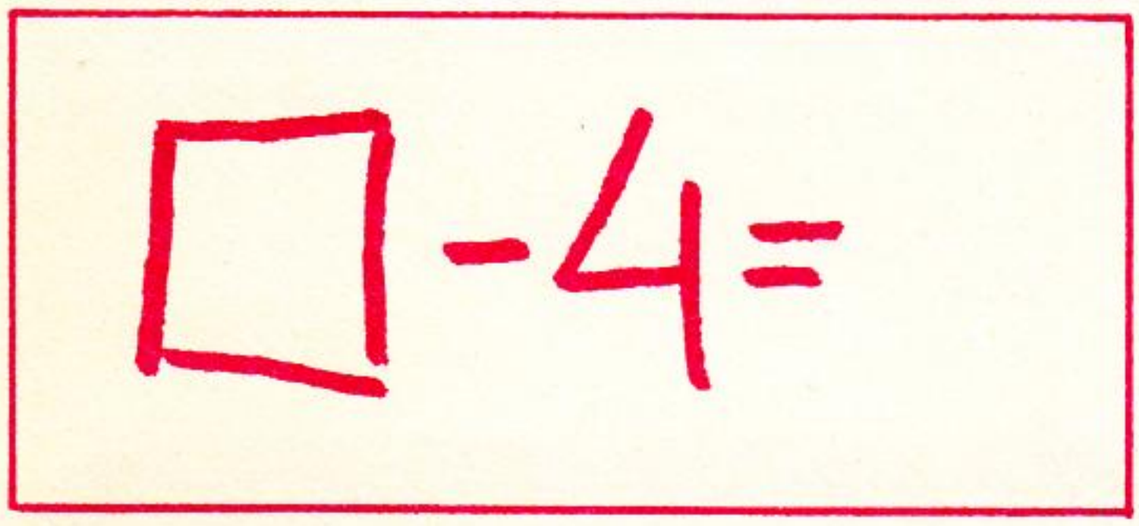


Write the question in your notebook, using the little square.
Find the answer.

Petya decided to write the sum down and do it on his own. He started thinking aloud. "We want to know how many people were in the car when it arrived. We don't know the number so we'll draw a square instead. Right?"

"Right," nodded Daddy.

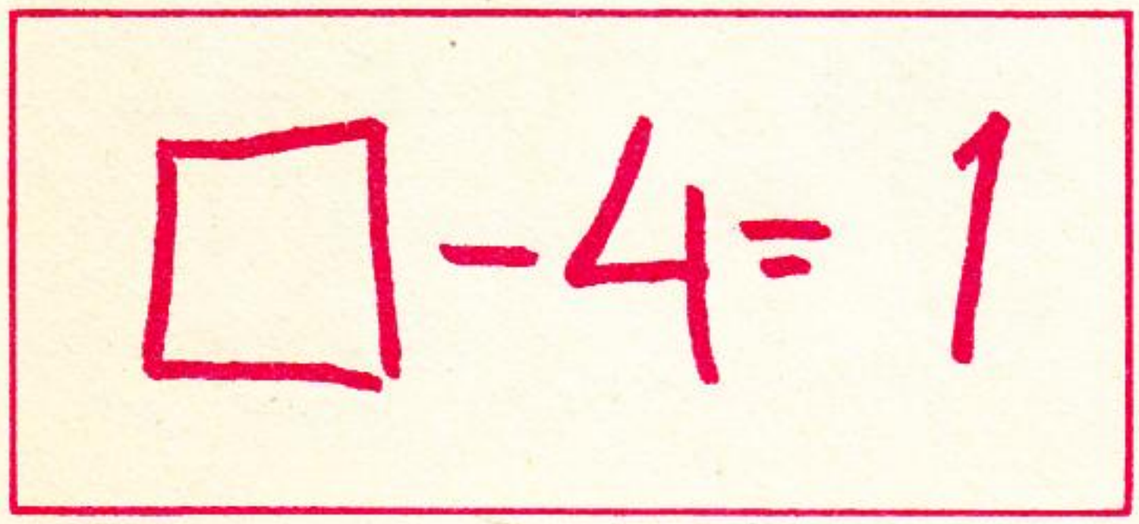
"Four people got out of the car," Petya went on. "So we have to take away four from the unknown number. We write it like this:



right?"

Daddy nodded again.

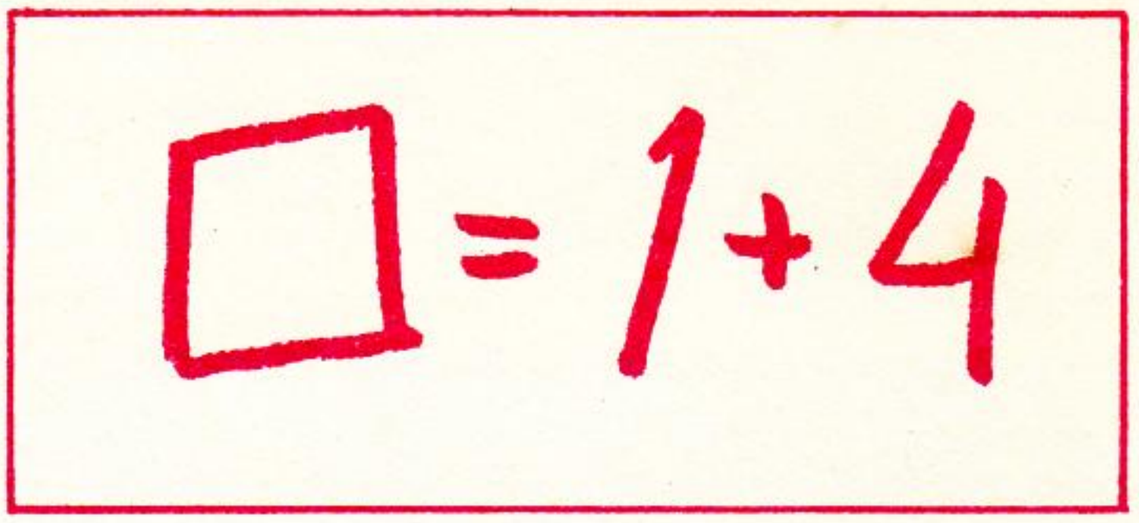
"But how many people were there still in the car?" Petya asked. "One. So we have to add 'leaves one'.



Is that right, Daddy?"

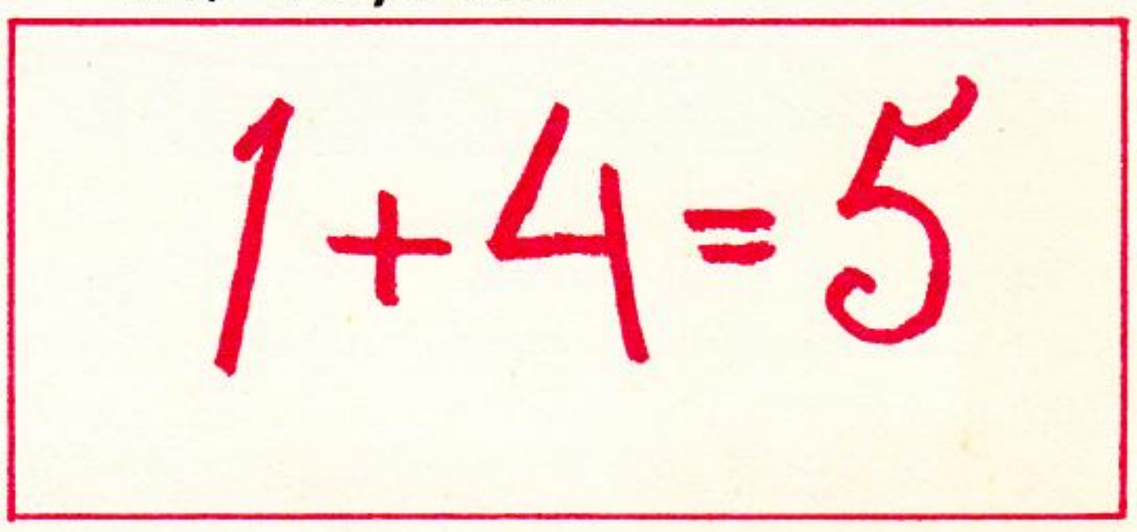
"Yes. So now you've asked the question correctly. But how do you find the unknown number?"

"Easy. You add four to one."



"And what else do you have to write?"

"This," Petya said.



"One plus four makes five. There were five people in the car."

"Good boy," said Daddy. "Now close your notebook. That's all for today. It's time you went to bed."

On Sunday morning the children were woken by Uncle Misha's loud, cheerful voice. "Heavens, how soundly you people sleep! And what a sunny morning it is! The hares and wolves in the woods are tired of waiting for us. It's high time we got started. I'll give you five minutes."

When they had left the last of the city behind Petya suddenly said, "I say, Daddy, there are five of us in the car, like in the sum we did yesterday."

"Yes, indeed," agreed Daddy. "But the difference is that in the sum we did, five people arrived in a car and only one was

left in it. But today one person arrived in the car and now there are five of us in it."

"Oho!" said Uncle Misha. "So you've got to five already. Well, Petya, here's something for you to think about. How many fingers have you got on your hand?"

"That's easy," Petya laughed. "Everyone knows there are five fingers on each hand."

"OK. What about this, then? How many wheels has our car got?"



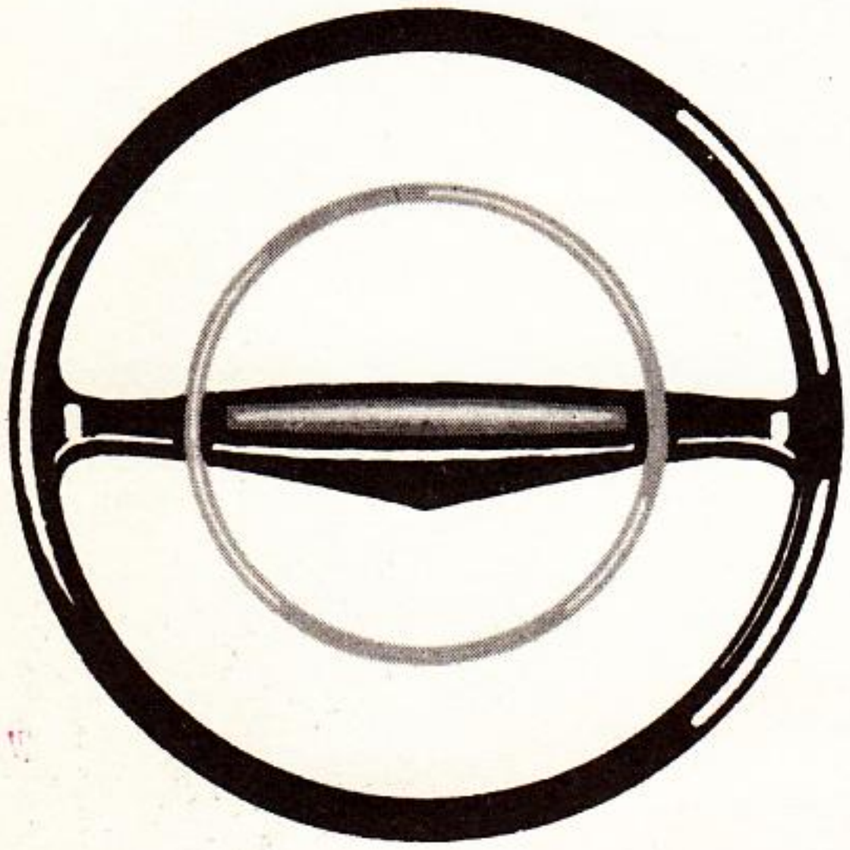


Petya was surprised. "But that hasn't got anything to do with five, Uncle Misha. Cars have four wheels."

"This one has five."

"But there's no such thing as a car with five wheels."

"Let's count, then. Two at the front, two at the back and one in the boot. How many does that make!"



Now you say: has this shape any angles!

"That doesn't count! The one in the boot is a spare."

"OK. I give in. You're not muddle-headed. You're very good at counting. What else do you know in maths!"

"Oh, various shapes. Triangles. Quadrilaterals."

With a mischievous smile, Uncle Misha pointed to the steering wheel. "Well then, if you know so much you'll be able to tell me how many angles this shape has."

Petya burst out laughing. "How can a wheel have angles! It's round."

"Well, what do you know! You're not to be foxed here either. You're quite right. The steering wheel is a circle. Can you think of anything else the same shape!"

"Wheels," cried Petya, "ordinary ones, I mean." He looked round and spotted Uncle Misha's wrist-watch. "Watches," he said. He was trying to think of other things to add to the list when suddenly the car came to a halt. The car in front of them had pulled up by the side of the road. A woman got out and raised her hand, asking for help. Uncle Misha and Petya went to see what was wrong. The engine had

stalled. Uncle Misha looked at it. "It's too serious for us to fix ourselves," he said. "We'll have to take your car in tow and pull you to the garage."

Daddy and Uncle Misha quickly tied the tow-rope and the cars moved off slowly.

"Why have we turned back?" asked Olya. "Aren't we going after all?"

"We'll get to our lake in the wood," said Uncle Misha.

"But when?" muttered Petya. "See how slowly we're going. You said yourself all the hares and wolves were tired of waiting for us."

"Hares and wolves will certainly wait when someone's in trouble."

An hour later they were at the lakeside.

"Let's all have a swim," said Uncle Misha. He plunged into the water and Petya rushed in after him. They splashed and dived and somersaulted noisily. Olya went in too but stayed near the bank. She splashed with her hands, squealing when she was sprayed with water.

A little later Uncle Misha and Petya settled down to fish.

"Look, there are circles here too," cried Petya. "When the float goes into the water it makes a circle, and it gets wider and wider."



Now you name objects that have the shape of a circle.



"Well done!" said Uncle Misha. "You' re very observant. Tell me, have you ever seen round windows?"

Have you ever seen round windows!

"Windows are rectangles," Petya said solemnly. "Is that a joke, Uncle Misha?"

"No. Windows are rectangular in houses. But in aeroplanes they're round. And on ships too, for that matter. They're called portholes."

"I've heard of them," said Petya. "But I didn't know a porthole was a round window."

"Can you see any more circles round here?" Uncle Misha asked.



Petya looked about him. Daddy and Olya were playing badminton. He was about to point to the racquets but then he hesitated. "A racquet's not exactly round, is it?" he asked.

"It's oval," said Uncle Misha. "Try again."

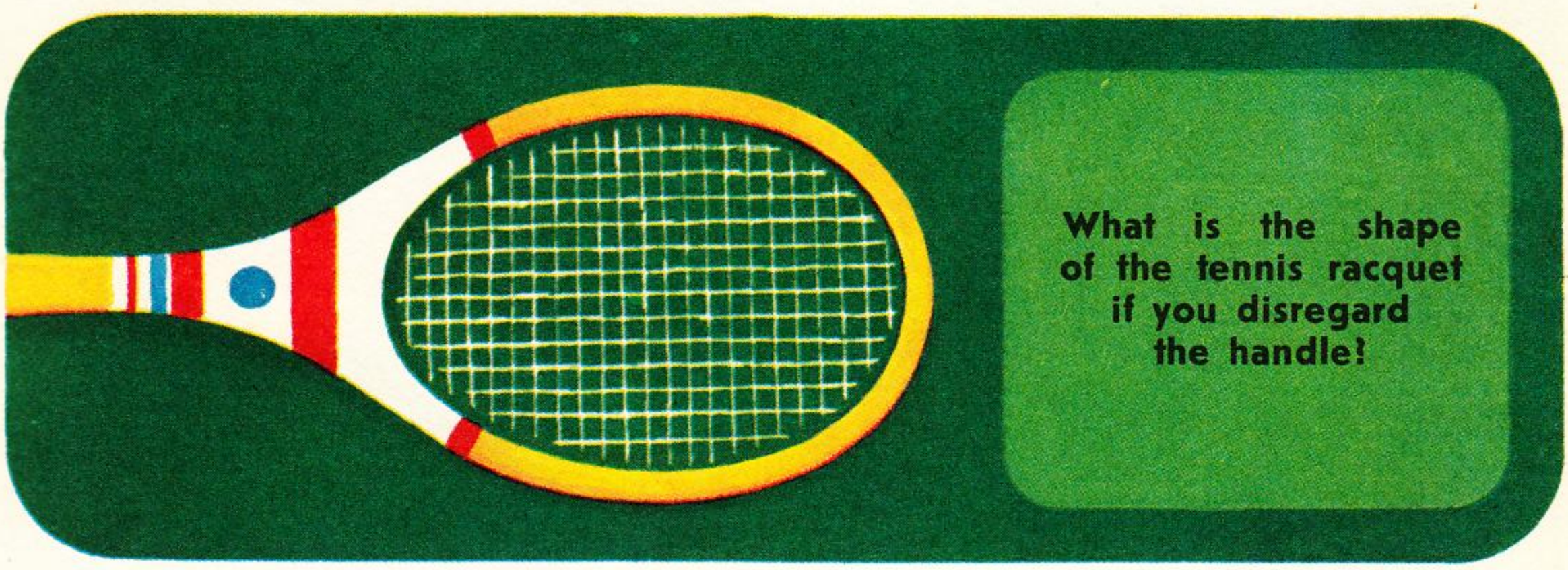
"We've listed everything round already."

"Are you sure? If you look more carefully you're bound to notice lots more circles. Look at this tree-stump from above. What do you see?"

"It's a circle!"

"And what about your shirt?"

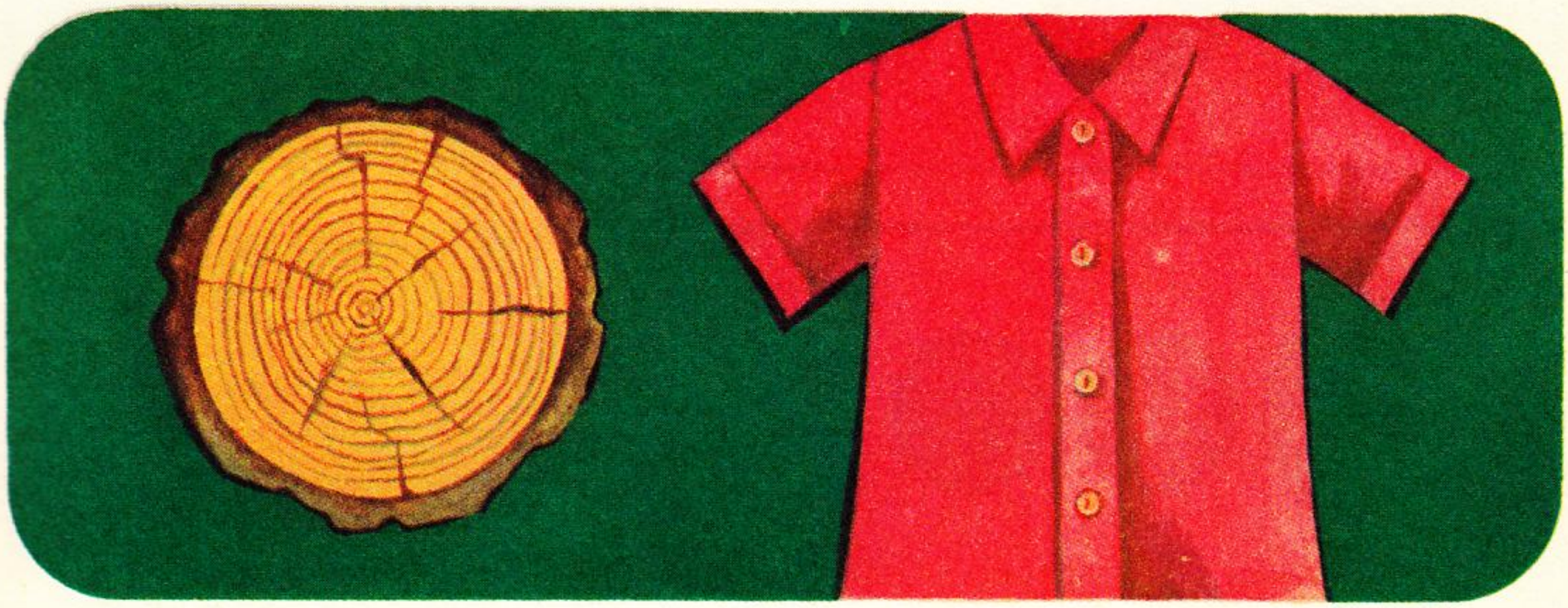
"The buttons are round," said Petya.



"And these?" Uncle Misha spilled a handful of coins onto the tree-stump.

"Oh!" cried Petya. "I forgot. Coins are round."

"Let's do another sum about five," suggested Uncle Misha. "I have to buy an



envelope. It costs five kopecks. How many different coins can we use to make up five kopecks?"

You try to work it out too.



Petya looked at the coins on the tree-stump. First he chose a five-kopeck coin.



Then he picked out two coins, one three-kopeck piece and one two-kopeck piece.



And then three coins, like this.



And then like this.



And Petya made up five kopecks from four coins.



And from five.

"Good boy!" said Uncle Misha. "Now write it down."

"But I haven't got my notebook," said Petya.

"I have a writing pad in the car," said Uncle Misha. "Now," he went on, when Petya was settled on the grass with the pad and a pen, "let's see how you can make up a five with other numbers."

Here is what Petya wrote.

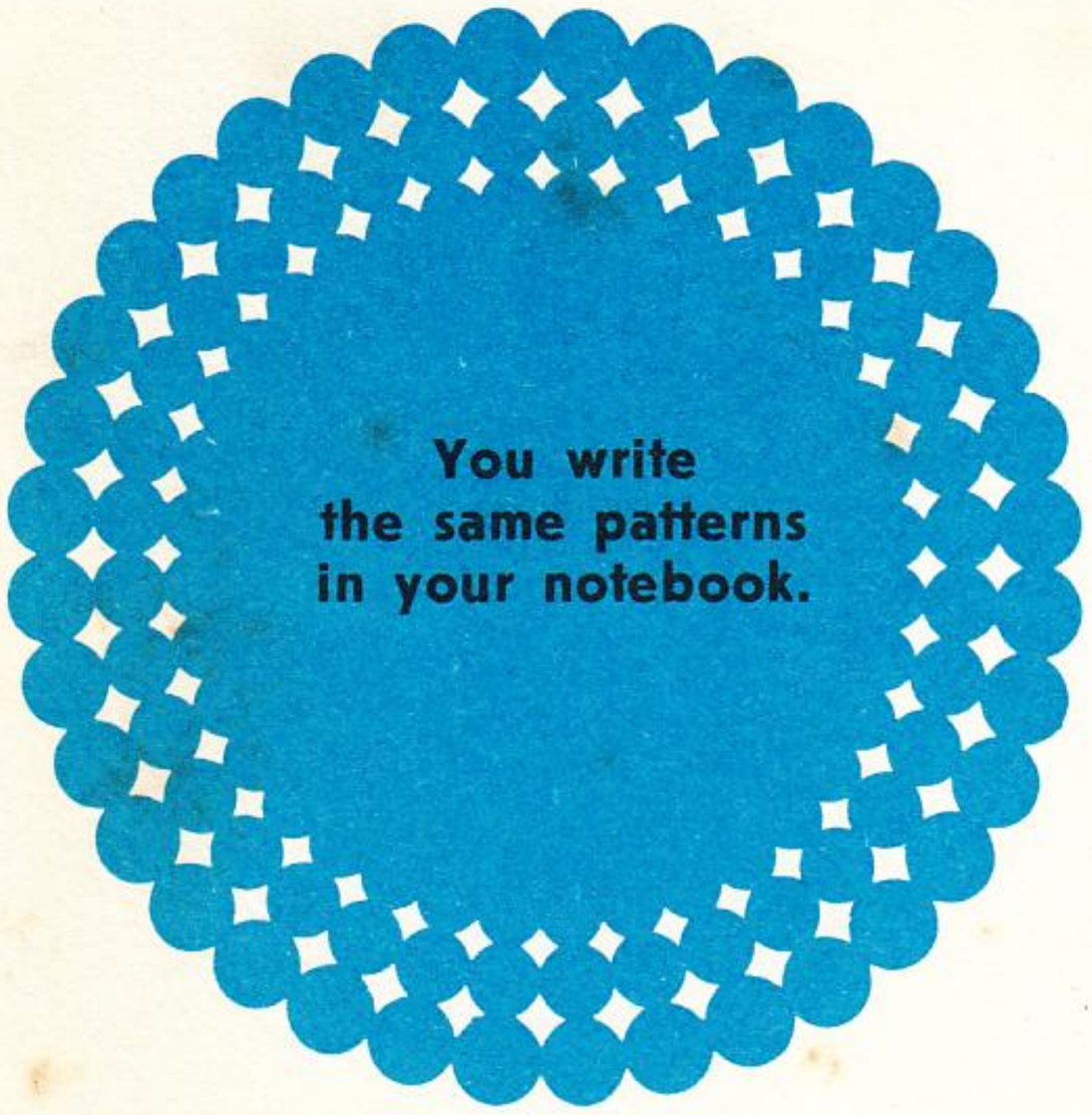
$5 = 3 + 2$

$5 = 3 + 1 + 1$

$5 = 2 + 2 + 1$

$5 = 2 + 1 + 1 + 1$

$5 = 1 + 1 + 1 + 1 + 1$



"You can write it like this, too, Uncle Misha," said Petya.

$$5 = 4 + 1$$

"Have you got a four-kopeck coin?"

"There's no such thing. But what you've written is quite right. You can make five like that." Uncle Misha closed his writing-pad. "Let's all go into the woods," he said.



HOW LYAPA THE DONKEY BUILT A HOUSE



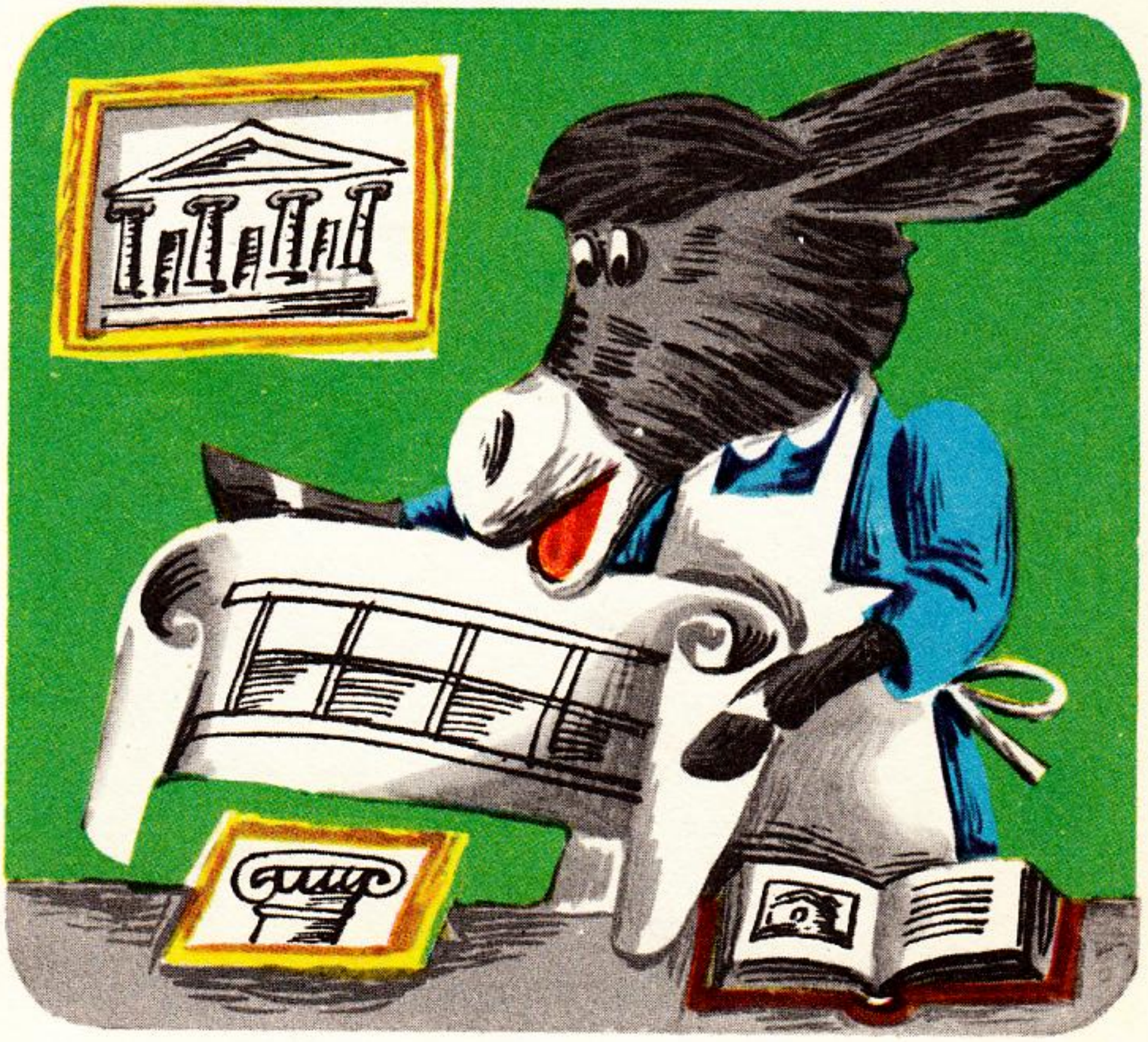
LYAPA: I want to help you, Mummy.

MOTHER: Good. In that case we'll do the housework together.

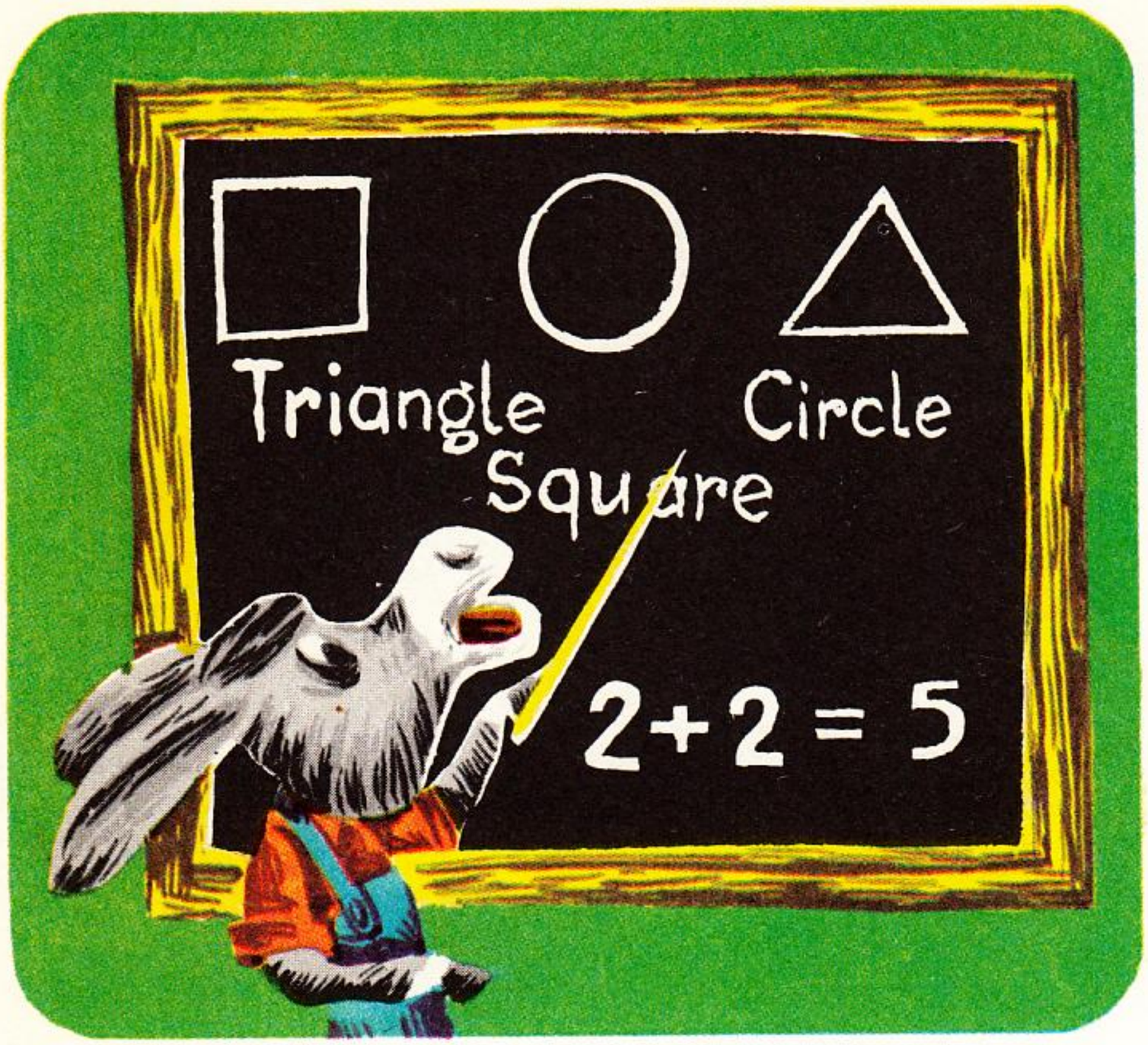
LYAPA: No, that's boring. I'd rather build us a new house.

MOTHER: But we have a good house already!

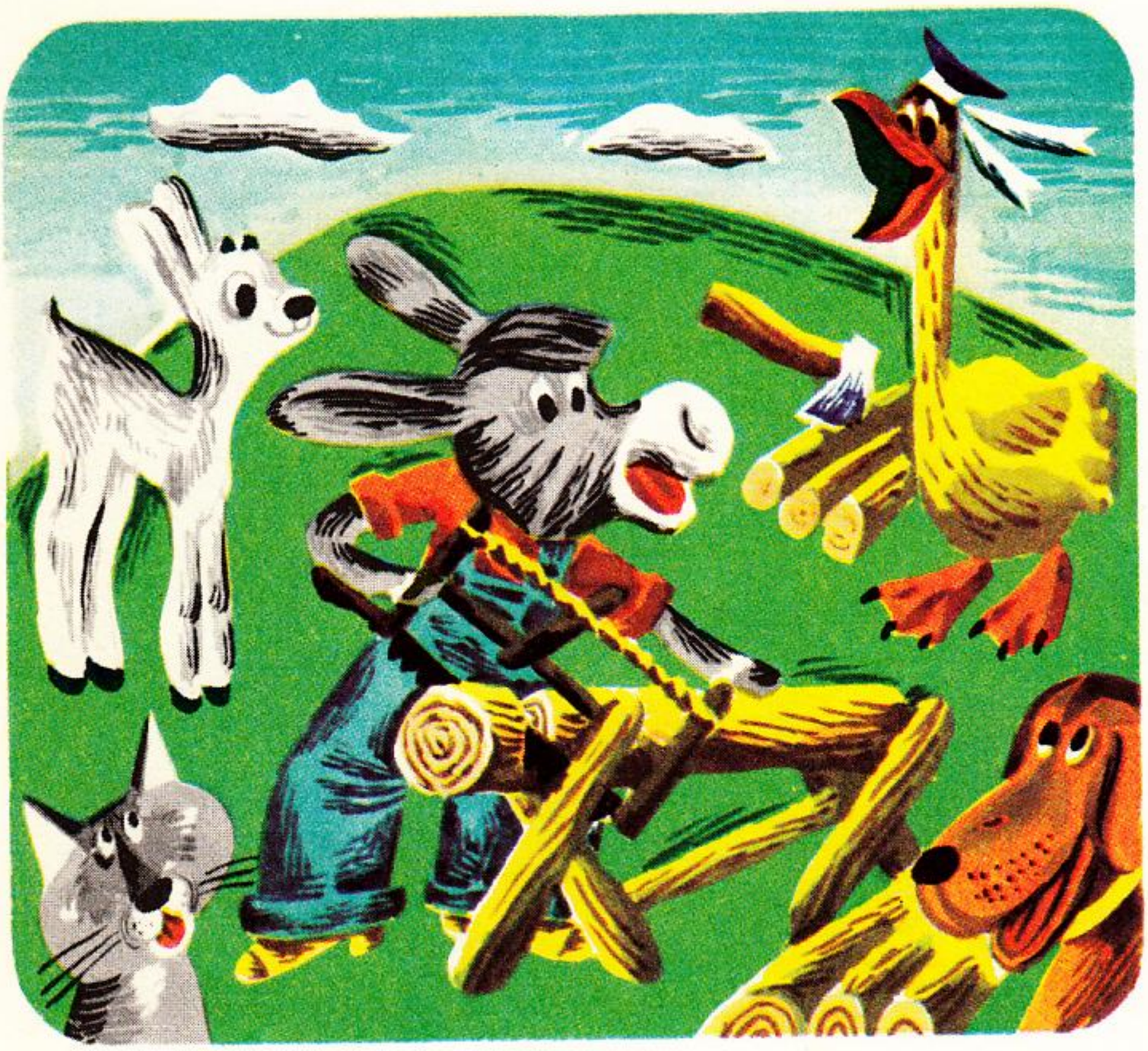
LYAPA: I'll build us an even better one.



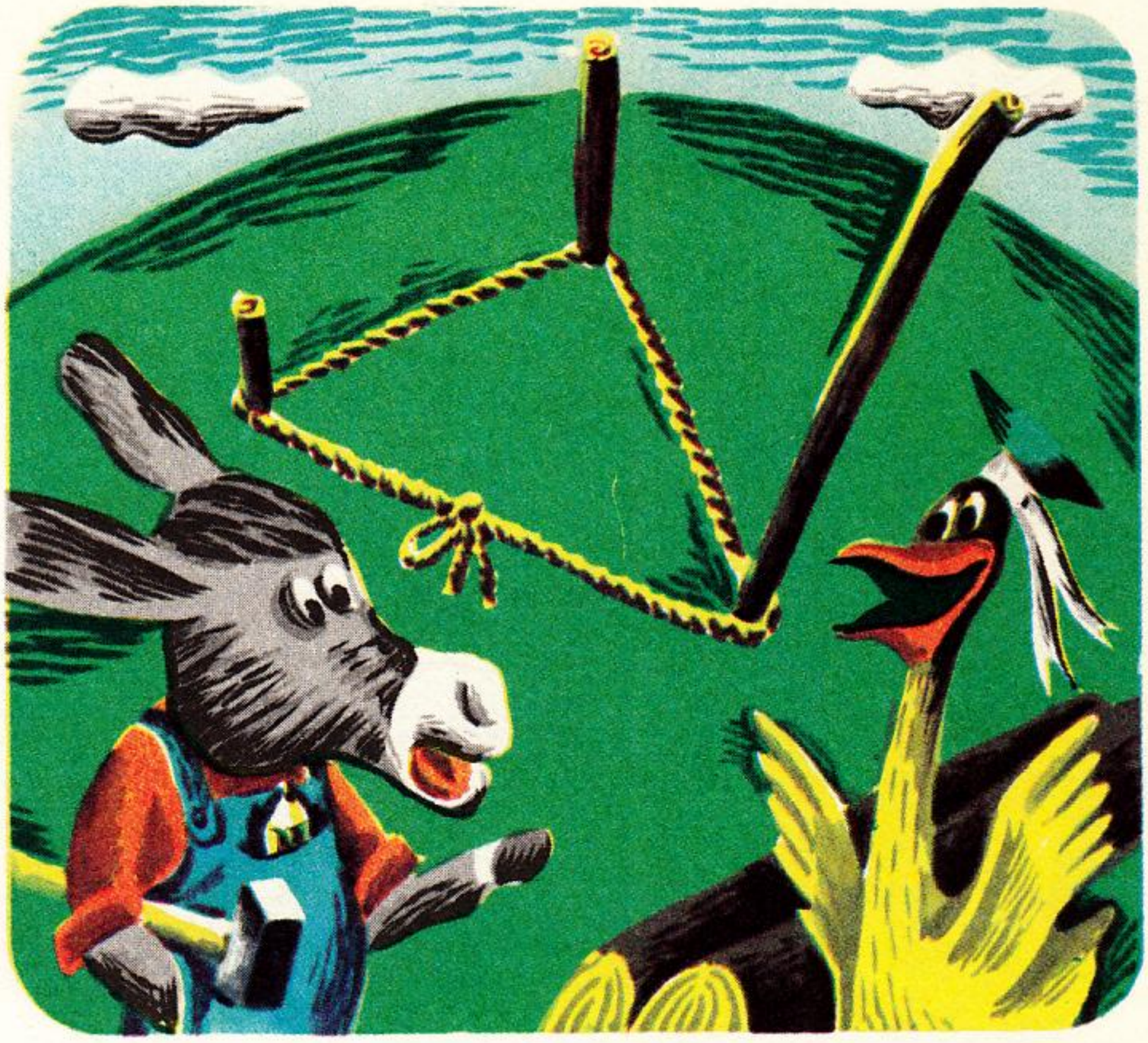
MOTHER: But building a house isn't that easy. You have to know a lot to build a house. You have to be able to count and draw all sorts of different shapes.



LYAPA: But I do know a lot! I can draw triangles and quadrangles and circles. And I can count up to five.



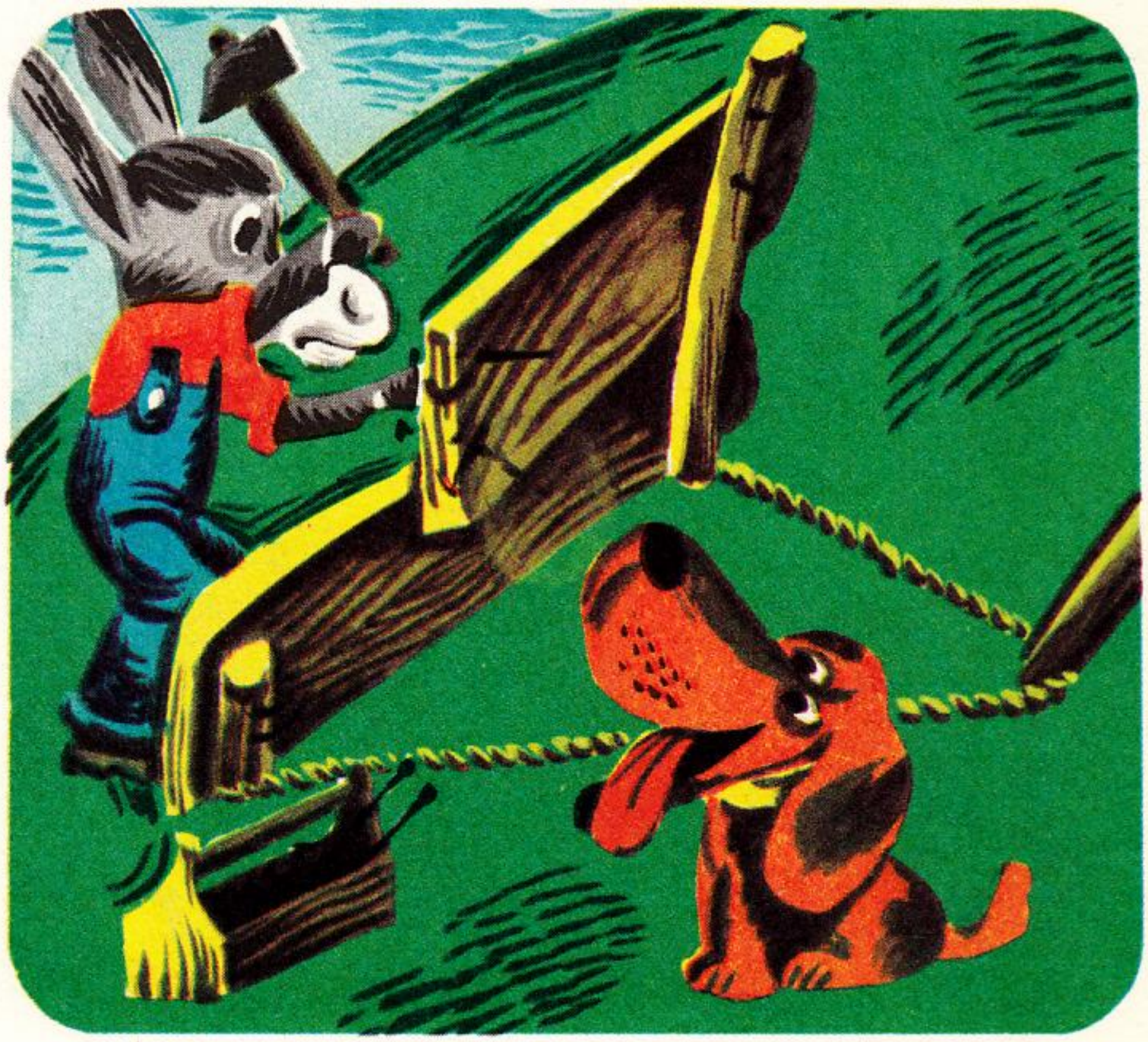
And Lyapa set off to build a house. By and by, all his friends came and joined him, Duckling, Kid, Kitten and Puppy. But Lyapa refused their help.



LYAPA: Building a house isn't that easy. You're not up to it. I'll do it all myself.

DUCKLING: We'll see. Do you know how many corners a house has, Lyapa?

LYAPA: Of course I do! Three.



PUPPY: Ha ha. You're getting everything all mixed up again, Lyapa. And how do you intend to build the walls?

LYAPA: I shall nail these planks to the posts. Oh, but there isn't anything to nail the planks to any more.

PUPPY: Exactly! All the posts should be the same height. Yours are all different.



LYAPA: It doesn't matter. They can stay as they are. I'll do the ceiling now. See how well it's turned out!

KITTEN: You think that's good! Look at the gap you've left in the wall! It's shaped like a triangle.



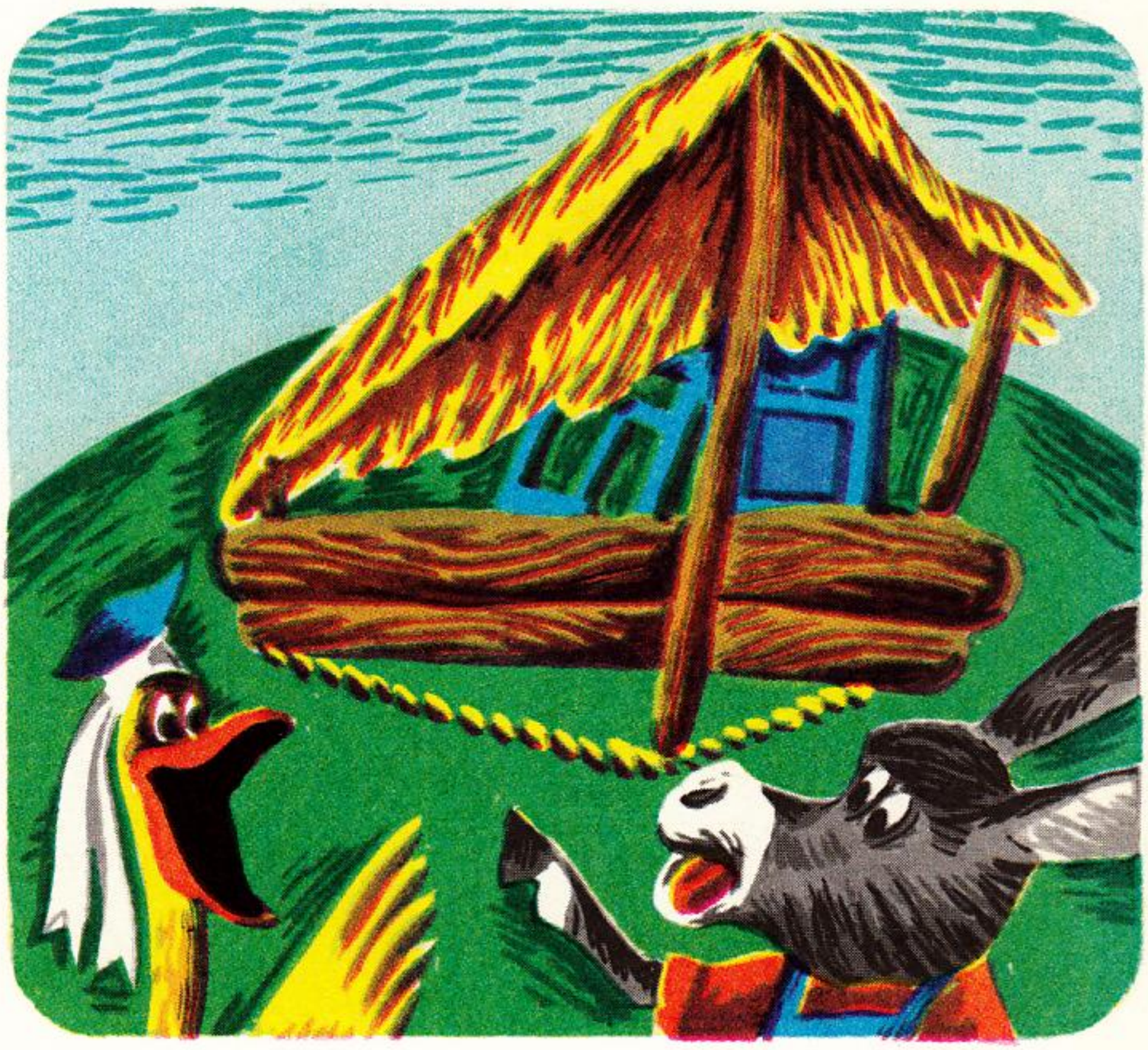
LYAPA: Oh, so it is. How shall I fill it in? I know, I'll make a door. There you are. That's better, isn't it?



KID: Not at all. The gap is still there. You haven't thought it out properly.

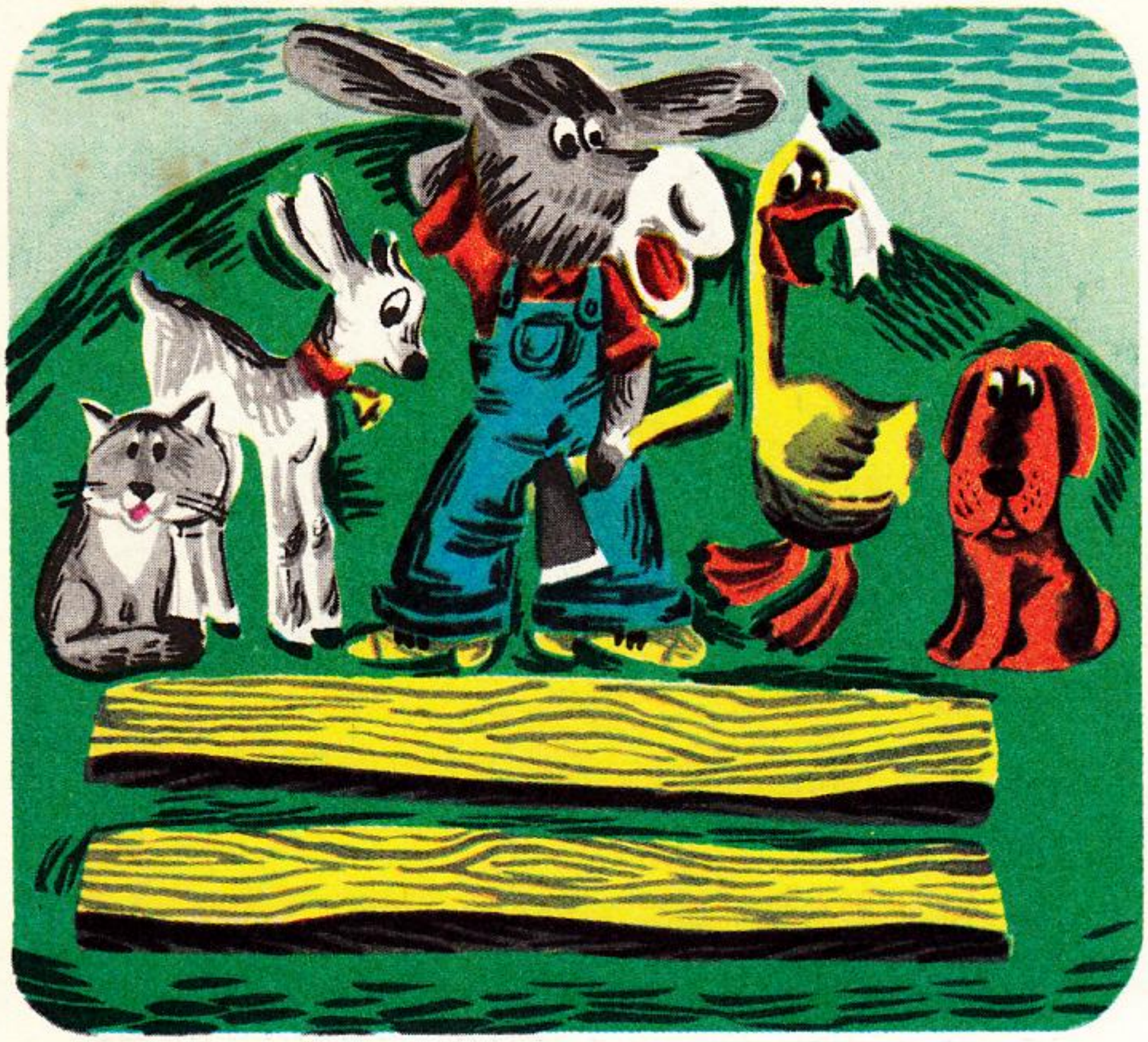
LYAPA: Perhaps not. But I'm going to think really hard now. I know! I'll make a window. But the gap is still there.

KITTEN: You *are* silly, Lyapa. You don't know shapes at all. The door and window are rectangles. They won't go in a gap shaped like a triangle.



DUCKLING: Anyway, it's a bit early to start worrying about the door and the window. You still have two more walls to build.

LYAPA: Oh, so I have. I forgot about them. I'll nail the planks now.



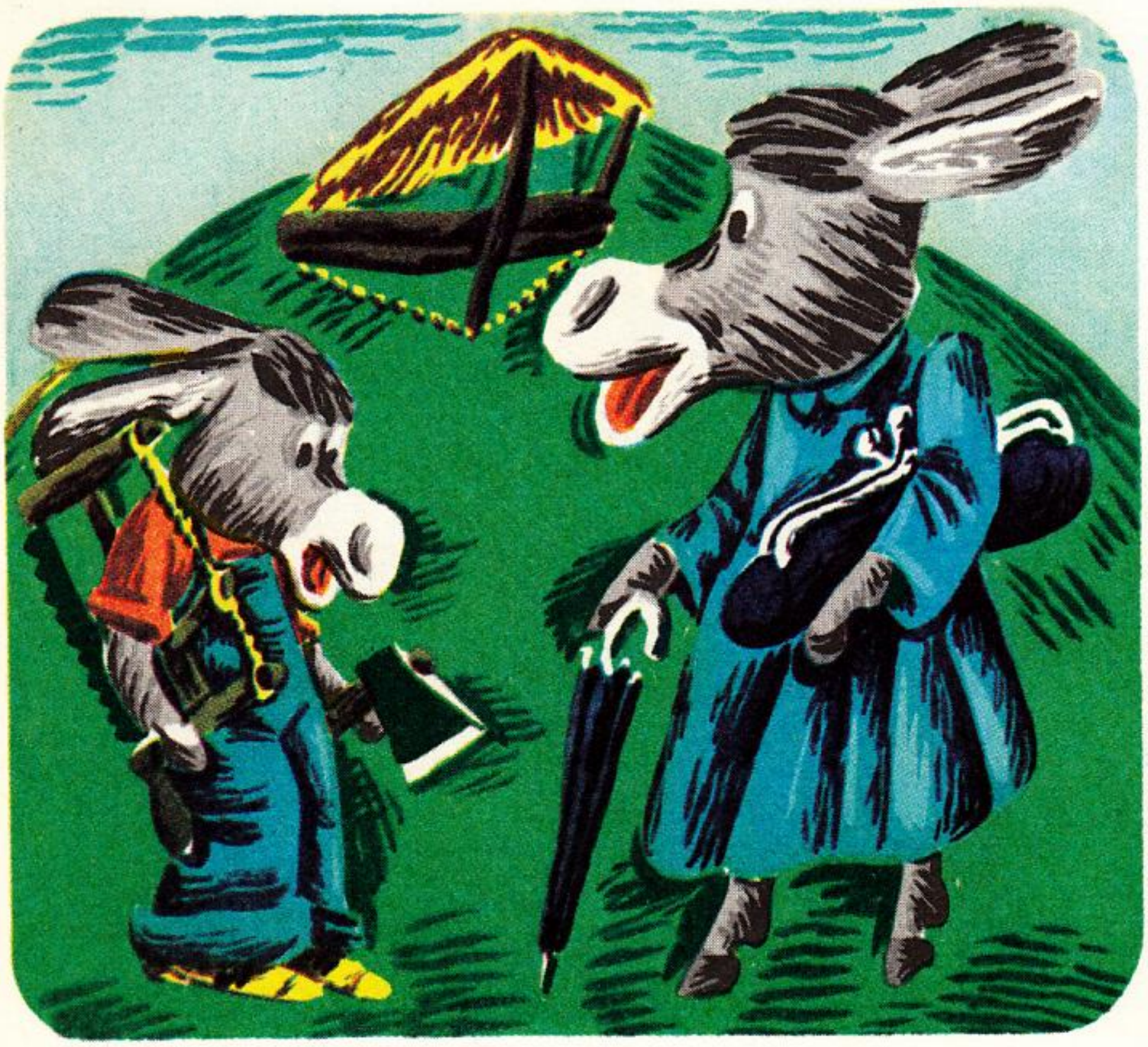
Oh, but there are only two planks left. That's not enough to build two walls with.

KID: You see, Lyapa, you should have worked everything out beforehand. How many planks do you think you'll need to build the walls?

LYAPA: Five, I suppose.

KID: Why five?

LYAPA: I can only count up to five.



MOTHER: No, Lyapa. Five planks won't be enough to build the walls. Now you can see that you know far too little to build a house. You still have a lot to learn.


The Sixth
Notebook

"I'm going to turn the television on, Mummy," Petya said.

"What are you going to watch?"

"Oh, I don't mind. Whatever's on."

"No, no, Petya. You know we've agreed that you and Olya should only watch children's programmes. I've looked at today's programmes in the paper. The one that's on now is for grown-ups."

"Can't I watch some of it?"

"Why? There are so many interesting things to do besides watch television. We can listen to records, for instance."

Olya clapped her hands. "Oh, do let's listen to records!"

Mummy got out some records. "First we'll listen to music, then we'll have fairy tales."

"Wait a minute, Mummy. Don't put the record on yet. I want to show you a trick." Petya looked mysterious. He took the record sleeve from Mummy. "Here's a square," he said. He took the record out of the sleeve and held the sleeve behind his back. "Abracadabra! Now it's a circle!"

Olya laughed delightedly.

"I can make it into a square again if you like. Shall I?"

"Not now," said Mummy. "Put your circle on that circle over there," she added, pointing to the turn-table. "Now sit on the sofa and we'll listen to the music."

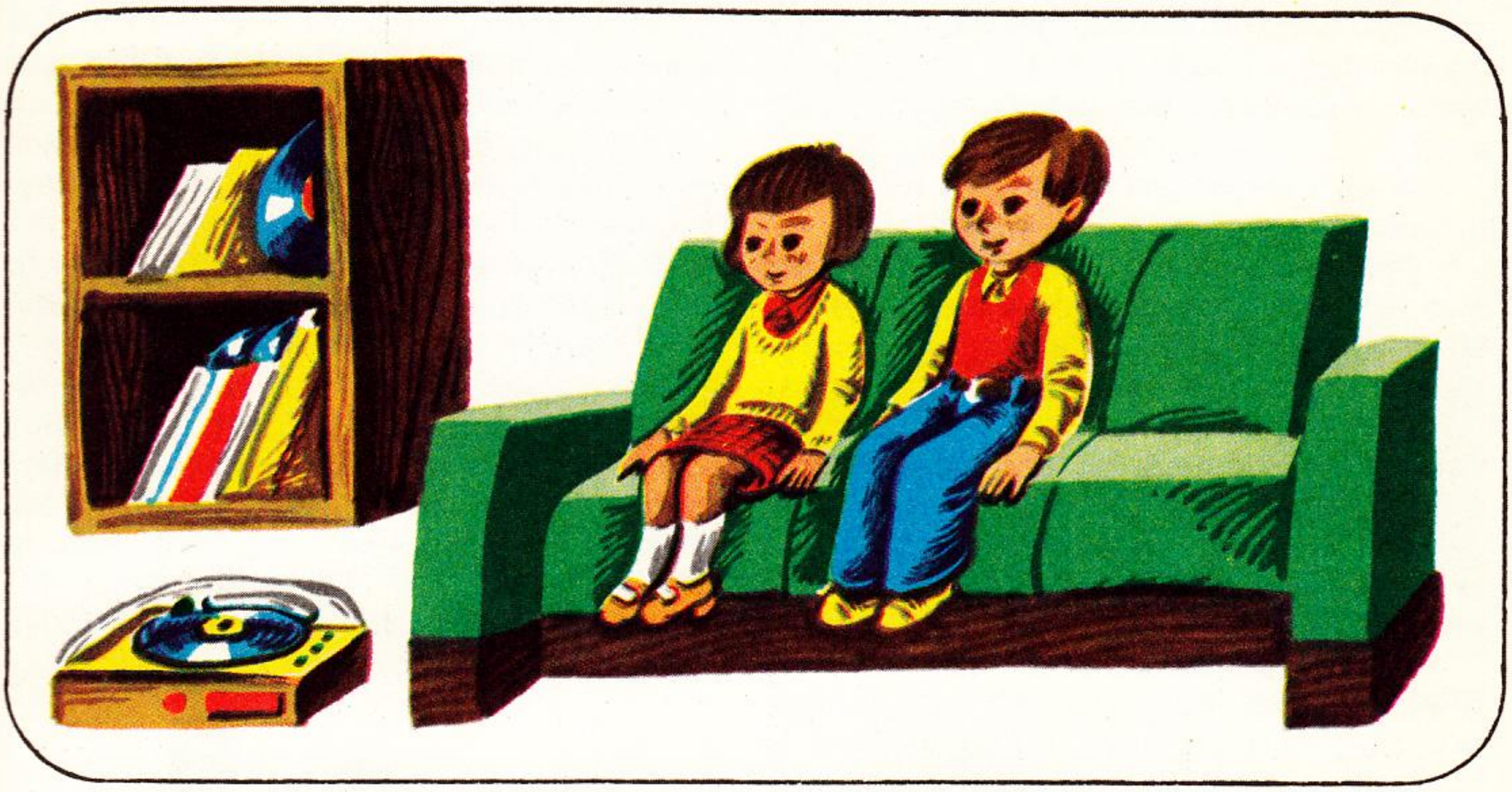




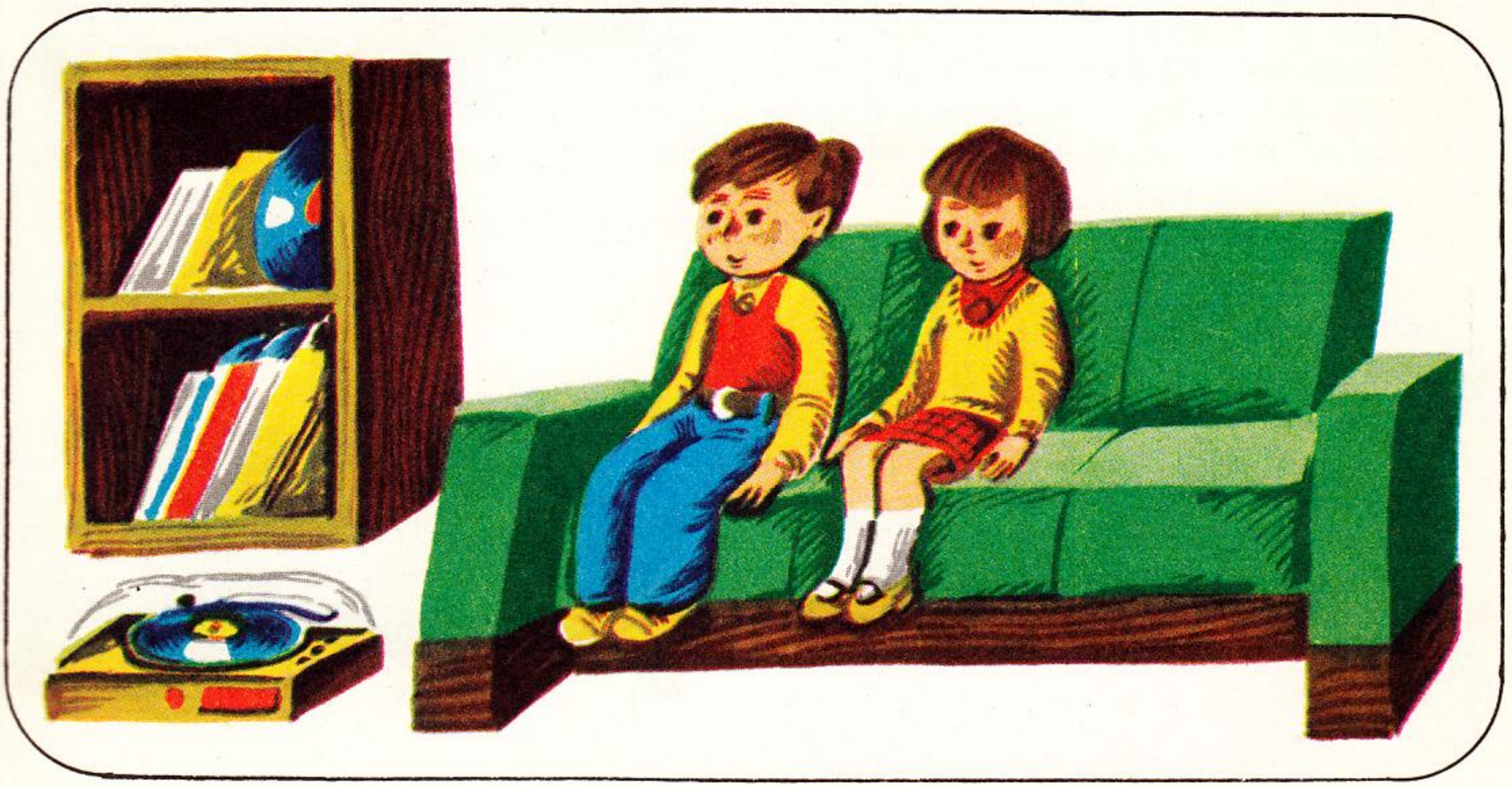
Quickly Petya sat down on the sofa next to the record-player. "Bags I sit here!" he cried.

"No," cried Olya. "I want to!"

"Don't argue, children," Mummy put in. "You can take turns to sit there."



She picked Olya up and put her on the sofa beside Petya. Then she turned on the record-player. The children were silent, absorbed in the music. When the time came to turn the record, Mummy suggested that they change places.



Then, when it ended, she said, "Happy now! There was nothing to quarrel about, was there! Maths helped you make up."

"What's maths got to do with it!" Petya asked.

"You've been counting. A record has two sides, and there are two ways you can sit together on the sofa by the record-player. Do you see!"

"Yes. When we were listening to the first side, I sat next to the record-player, and Olya was next to me. But when the second side was on Olya sat next to the record-player and I sat next to her. It's easy."

"Yes," Mummy agreed. "It's not very difficult when there are only two people involved. But suppose I had wanted to sit next to the record-player as well, then it would have been much harder to work out."

"Then we could all have had a quarrel," said Olya. "Oh, do let's have a quarrel, all of us!"

"There's no need to quarrel," Petya pronounced. "I know now many ways there are of putting three people side by side on the sofa. There are three of us, so there are three ways."

"Slow down," said Mummy. "Let's think about it carefully. First let's put Olya next to the record-player."

"Yes," agreed Petya. "That's the first way. Then I'll sit next to the record-player. That's the second way. Then the third way is with Mummy sitting next to the record-player. That's right, isn't it!"

"You're in too much of a hurry, Petya. You say Olya sitting next to the record-player is the first way. But that's only part of it. There are still two different ways in which you and I can sit. You can sit next to Olya and I can sit next to you.

And then I can sit next to Olya



and you can sit next to me.

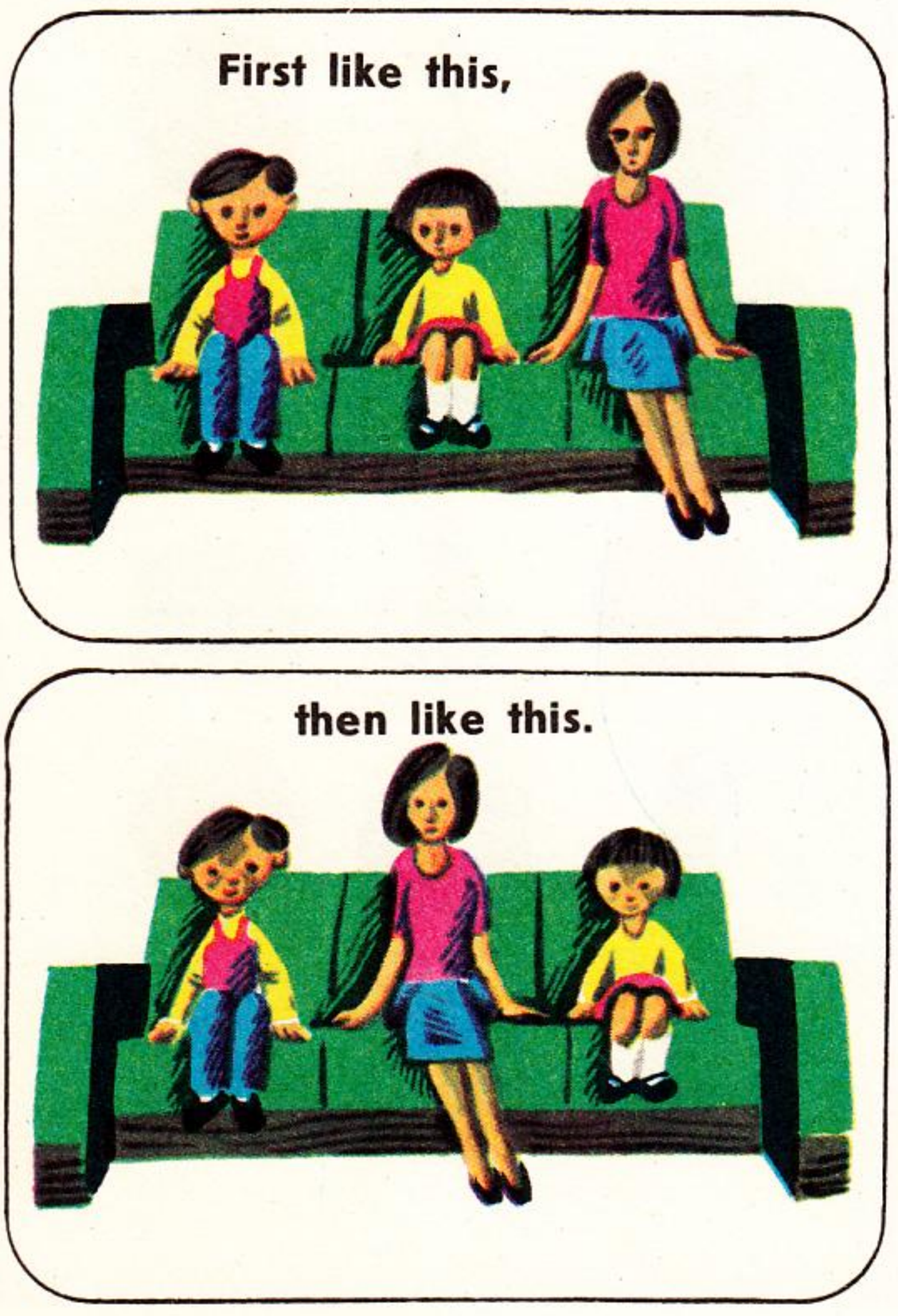


Is Petya right?

So it's not just one way, you see. It's two. But how many ways does that make altogether? What's the next step?"

Have you worked out how many ways three people can sit side by side on the sofa?

Petya started thinking aloud. "Let's pretend I'm sitting next to the record-player. Then Mummy and Olya can sit beside me.



That gives us two more ways. And now it's Mummy's turn to sit next to the record-player. And that gives two more ways.





How many does that make altogether? I have to count — six!"

"That's it," said Mummy. "Do you know how to write six? Get your notebook and I'll write a six in it for you."

Petya busied himself writing sixes.



Now you write six as many times as you can in your notebook.

"I'm sitting my teddy-bear and my hare and my doggie on the sofa," Olya put in. "Draw six pictures of them."

"Here you come with your toys again! We're studying ma-the-ma-tics, can't you see?"

"Petya, don't scold Olya," Mummy interrupted. "That's a very good idea she's given us.

"But how do we write down the sum about changing places!" Petya wanted to know. "Is this right? How did we work

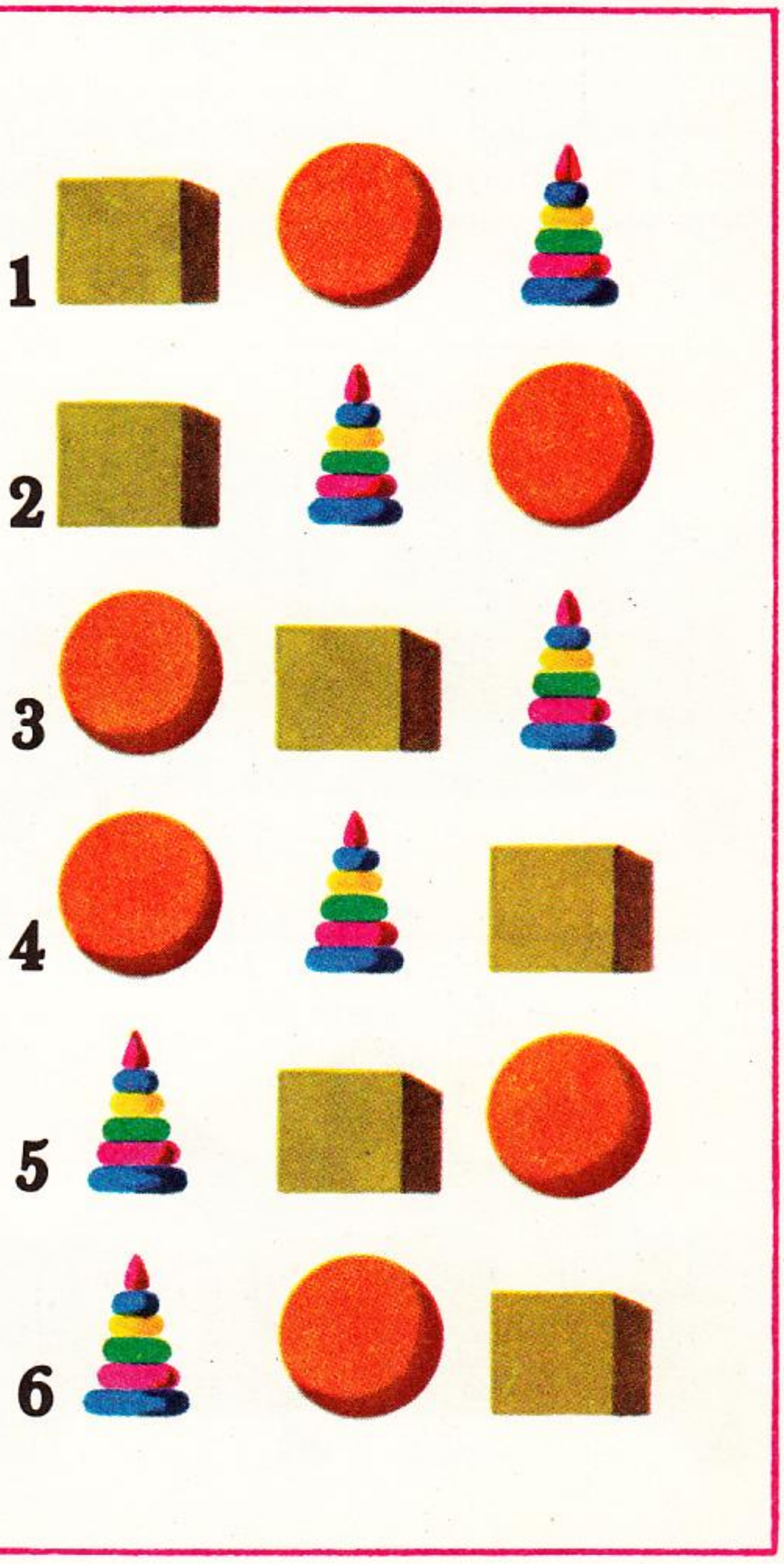
2+2+2=6

it out? When Olya is next to the record-player there are two ways. When I'm next to it there are two more. When Mummy is next to it there are two more again. That makes six altogether."

"Well done!" said Mummy. "And now, how do you think we should show it on paper!"

You think about it too.

Petya looked thoughtful. "We could draw six pictures of ourselves sitting on the sofa."



"I was just going to say that we don't necessarily have to draw ourselves. It would be better to show Olya's toys on the sofa, or even just a block, a ball and a pyramid. They'd be much easier to draw."

Now you take three different toys and put them in every possible order on the sofa or the table.

"It's much easier to draw numbers instead of toys," Mummy continued. "Take three different numbers and show the six possible positions for them. Do it in your notebook, Petya."

Now you do it in your notebook.

1 2 3
1 3 2
2 1 3
2 3 1
3 1 2
3 2 1

Petya tried to do the job as best he could. He was so pleased with his neat figures that he decided to show them to Daddy that evening.

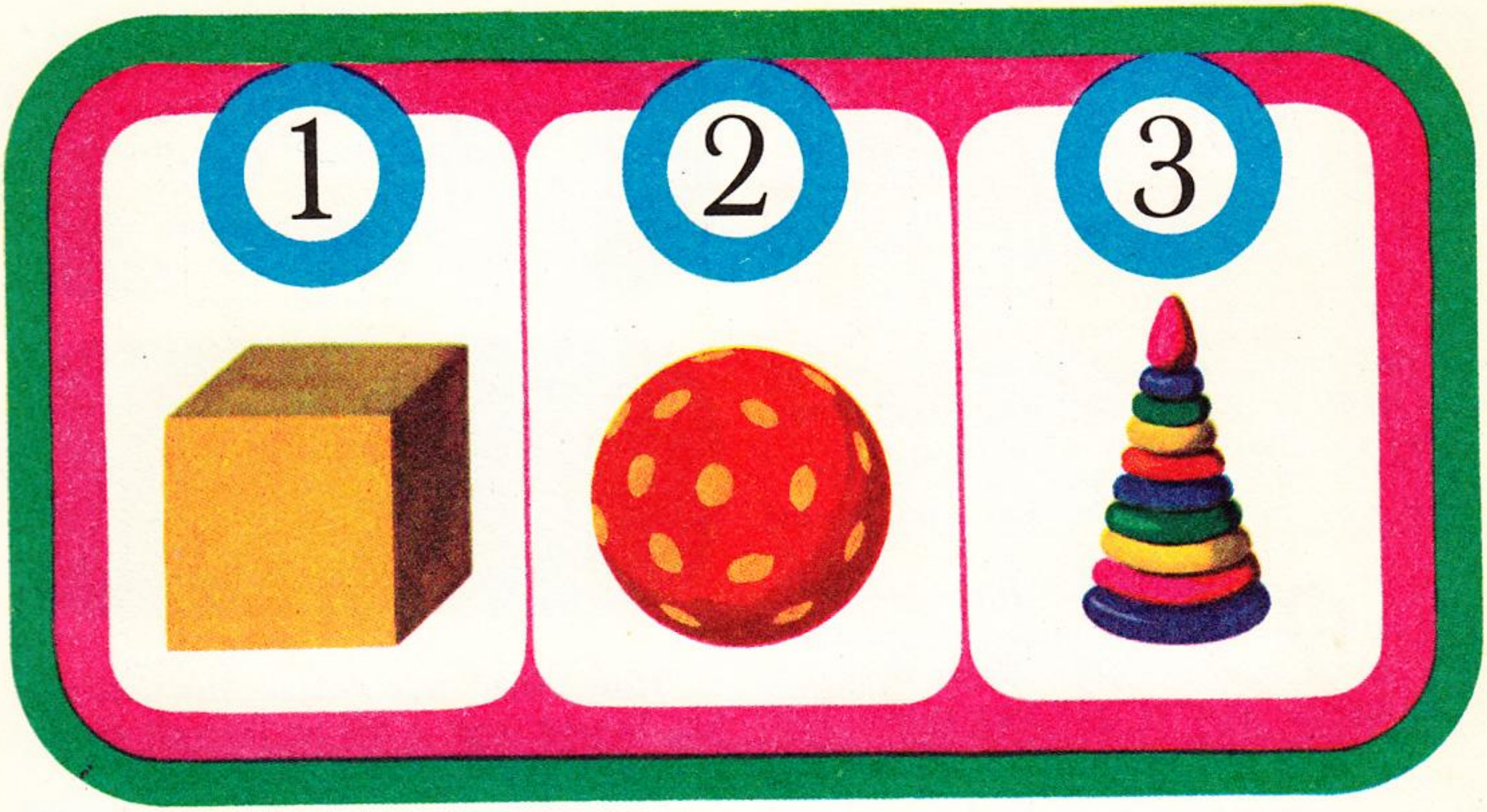
Daddy had barely got through the door when Petya ran to meet him with the notebook in his hand. "See what I've written here!" he cried. "It's the answer to a sum, but you'll never guess what the sum is."

Daddy smiled. "Yes, it does look difficult. But I'll have a try. Just a moment, I'll change and wash and then get down to business."

A few minutes later he looked attentively at Petya's work.


1
2
3


1
2
3



"Well? Can't you guess?" Petya was impatient.

Mummy and Daddy exchanged glances. Daddy looked embarrassed. Then he spread out his hands helplessly. "I give up. You'll have to explain everything."

Proudly and importantly Petya began to explain. "This shows how the three of us changed places on the sofa. 1 is Olya, 2 is me and 3 is Mummy. I've written them in all six different orders."

"And I put my teddy-bear and my hare and my doggie on the sofa," said Olya.

"Don't forget the building block, the ball and the pyramid," Mummy reminded them.

"And I've written it here in numbers. Do you understand, Daddy?"

"Yes, I understand it very well," Daddy smiled. "You've shown all possible ways of arranging any three objects. Each one is a pattern, and there are six patterns."

"Let's do some more problems with six," Petya suggested.

"We've had enough maths for today," said Mummy. "Besides, we were planning to listen to some recorded fairy-tales."

"Oh, good!" exclaimed Olya happily. "Let's listen to fairy-tales."

"I'd like to listen too," said Daddy. "And we'll do sums with six tomorrow."

Next day Petya took out his notebook again.

"Now, look carefully at the pattern," said Daddy.

$$2+2+2=6$$

"How did we get here? Two plus two plus two, that is, two three times. There's a shorter way of writing it.

$$2\times3=6$$

And you can say it like this. Two times three is six. You say it now, Petya."

Now you say it out loud.

+ ×

Do you see the difference between the two signs? What is it?

"Now I see," said Petya. "The plus sign has turned over a bit so instead of add it means 'times'."

"Yes," said Daddy. "Turning a sign over can give you quite a different sign. For example, if a six is turned upside down, you get a different number, a nine. But we'll get to nine in due course."

6 9

Petya repeated it and asked, "Does the cross mean 'times'? Isn't it a plus sign? That means add, doesn't it?"

"No. Of course, this particular cross and the plus sign are very much alike but if you look carefully you'll see that they're written differently. One is +, the other is ×. D'you see the difference?"

Petya laughed. "Isn't that fun? A nine is a six upside down."

"That's right. Or you can say it the other way round. A six is a nine upside down."

Petya laughed again. Then he thought a little and said, "But a plus upside down is still a plus and a cross upside down is still a cross. Has it got a name, Daddy?"

"It's called the multiplication sign. There's another sign for multiplication, a dot. So you can also write it this way:

$2 \cdot 3 = 6$

But you say it exactly the same. Two times three is six. Or sometimes, two threes are six. Say it after me."

Now you say it.

"Two threes are six," said Petya.

When Olya heard it she ran up and cried, "I can count like that! Two twos are four! I know a song about it."

"Yes, you know a song. But what are two twos? We still have to work that out, don't we, Daddy?"

"Yes, in spite of the fact that 'everyone knows, everyone knows'," Daddy laughed, "we'll have to check it. How would you go about it, Petya?"

And what about you?

"What does two twos mean?" Petya asked. "It's two multiplied by two, isn't it?"

"That's right."

"And what does two multiplied by two mean? It means take two two times, and that means add two to two, doesn't it?"

"Yes."

"But two and two makes four. So, we've checked that two twos are four."

"Well done! Now write it in your notebook."

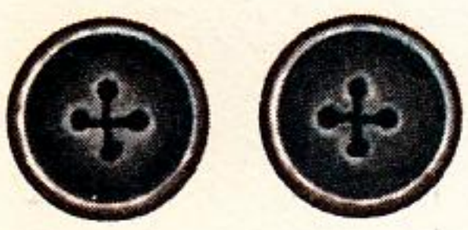
You write it in your notebook too.

Petya wrote in his notebook:

$2 \times 2 = 4$

"And here's a sum to go with it. I think even Olya'll be able to do this

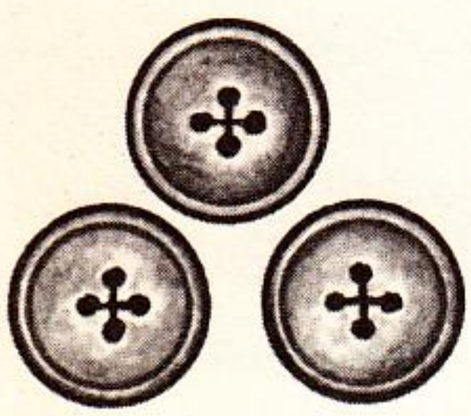
one. My jacket has two pockets. Each pocket has two buttons. How many buttons are there altogether!"



Olya started to count the buttons on Daddy's jacket. Meanwhile Daddy asked Petya, "Is this sum the same as the one you've written down!"

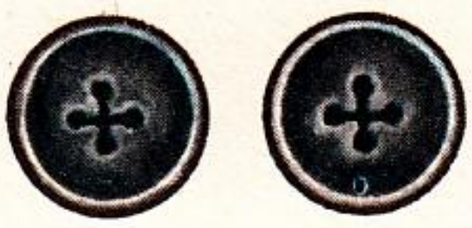
"Of course it is. There are two buttons on one pocket and two on the other. So we add two to two, or we take two twice. And that gives two twos."

"Well done! You've explained it very well," Daddy said. "And now we'll do it slightly differently. Let's say the pockets on my jacket have three buttons each. How many buttons are there altogether! Work it out and write down the answer."



You work it out too and write the answer in your notebook.

Petya began to reason aloud. "One pocket has three buttons, the other has three as well. So we add three to three.



3 + 3 =

3 × 2 =

That's the same as two times three and that makes ... six! Let's write it!"

3 + 3 = 6
3 × 2 = 6

How did you write your answer!

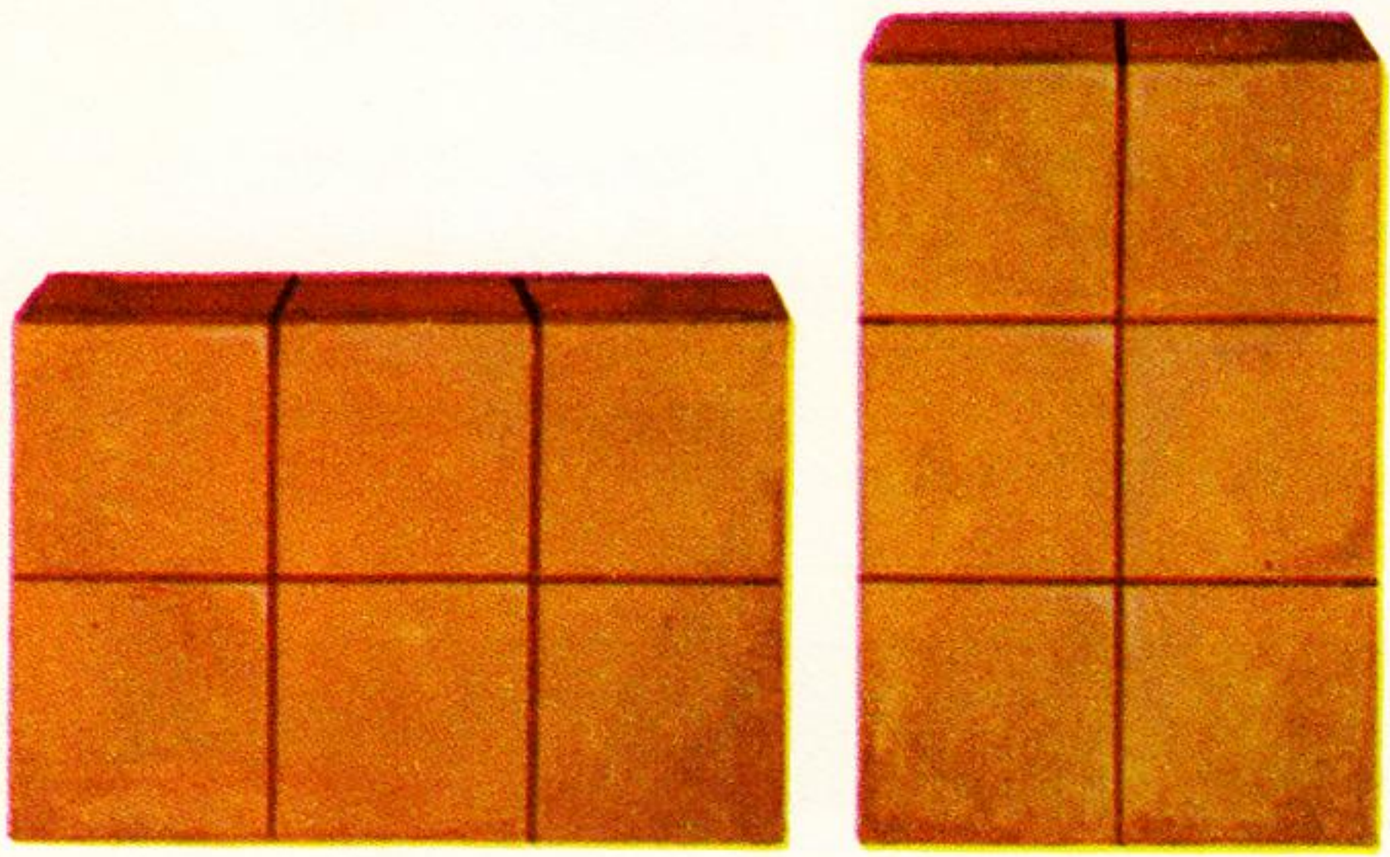
"I think you can write it like this, Daddy," Petya said. "And then like this. Is that right?"

"Yes. Now let's do the second one."

"Three times two is six. Oh, but Daddy, we had two times three and that made six as well. That means it's all the same. Three times two or two times three. They both make six."

"Yes, the answer's the same. And it's easy to show why. Let's take some building blocks and make a house with them."

Now you take
six building blocks
and build a house with them.

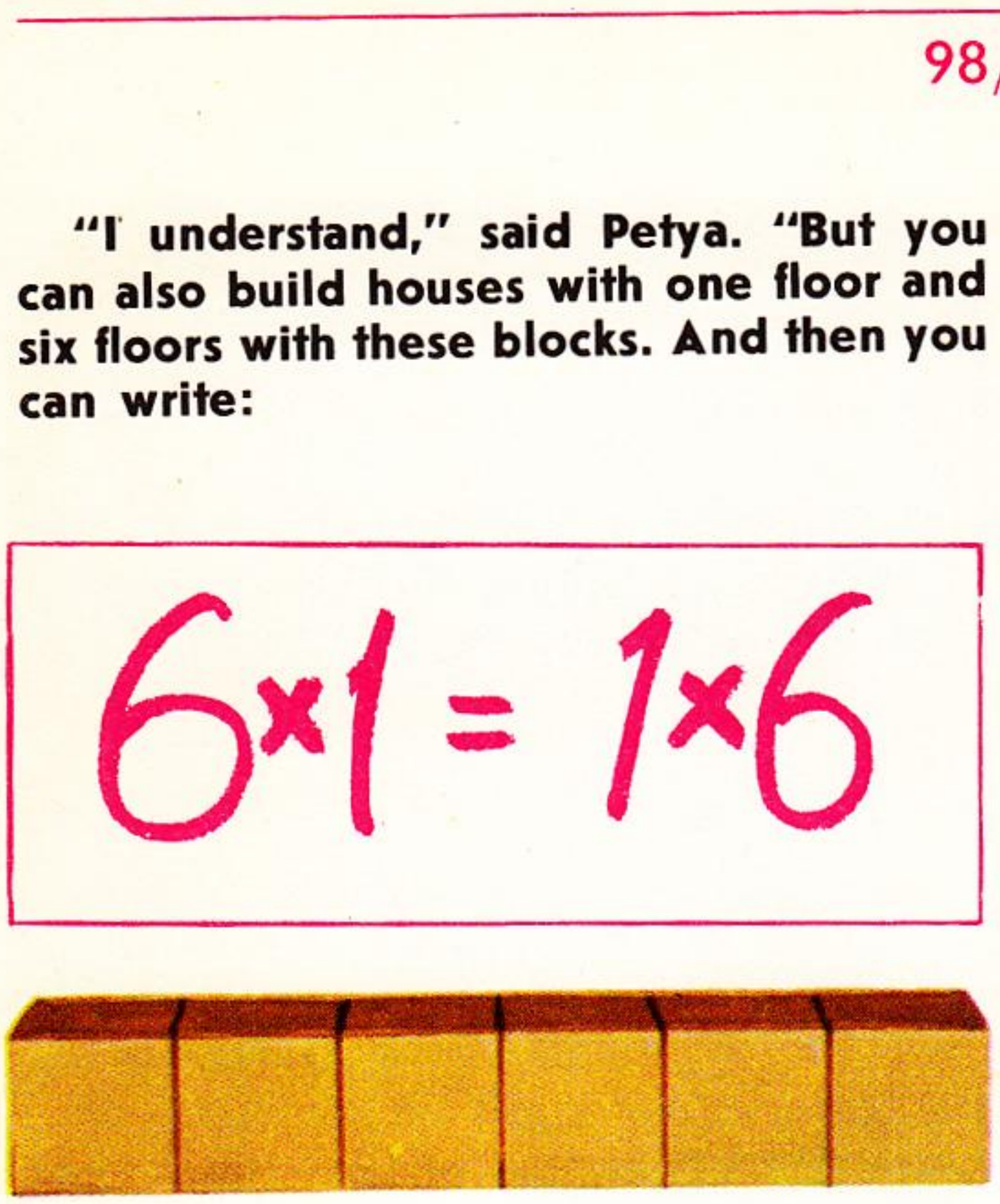


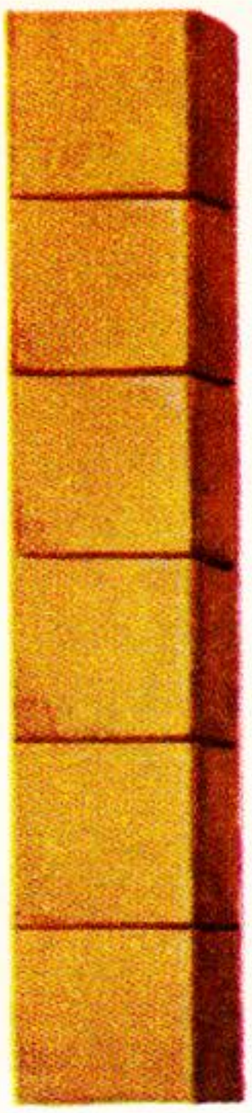
"So," continued Daddy, "our house has two floors, three blocks each. What's the simplest way of counting the blocks? Three times two! Now, let's build another house with the same blocks. It'll have three floors, two blocks each. Now it's easier to count this way: two times three. And so we can see that three times two or two times three are the same."

$3 \times 2 = 2 \times 3$

"I understand," said Petya. "But you can also build houses with one floor and six floors with these blocks. And then you can write:

$6 \times 1 = 1 \times 6$



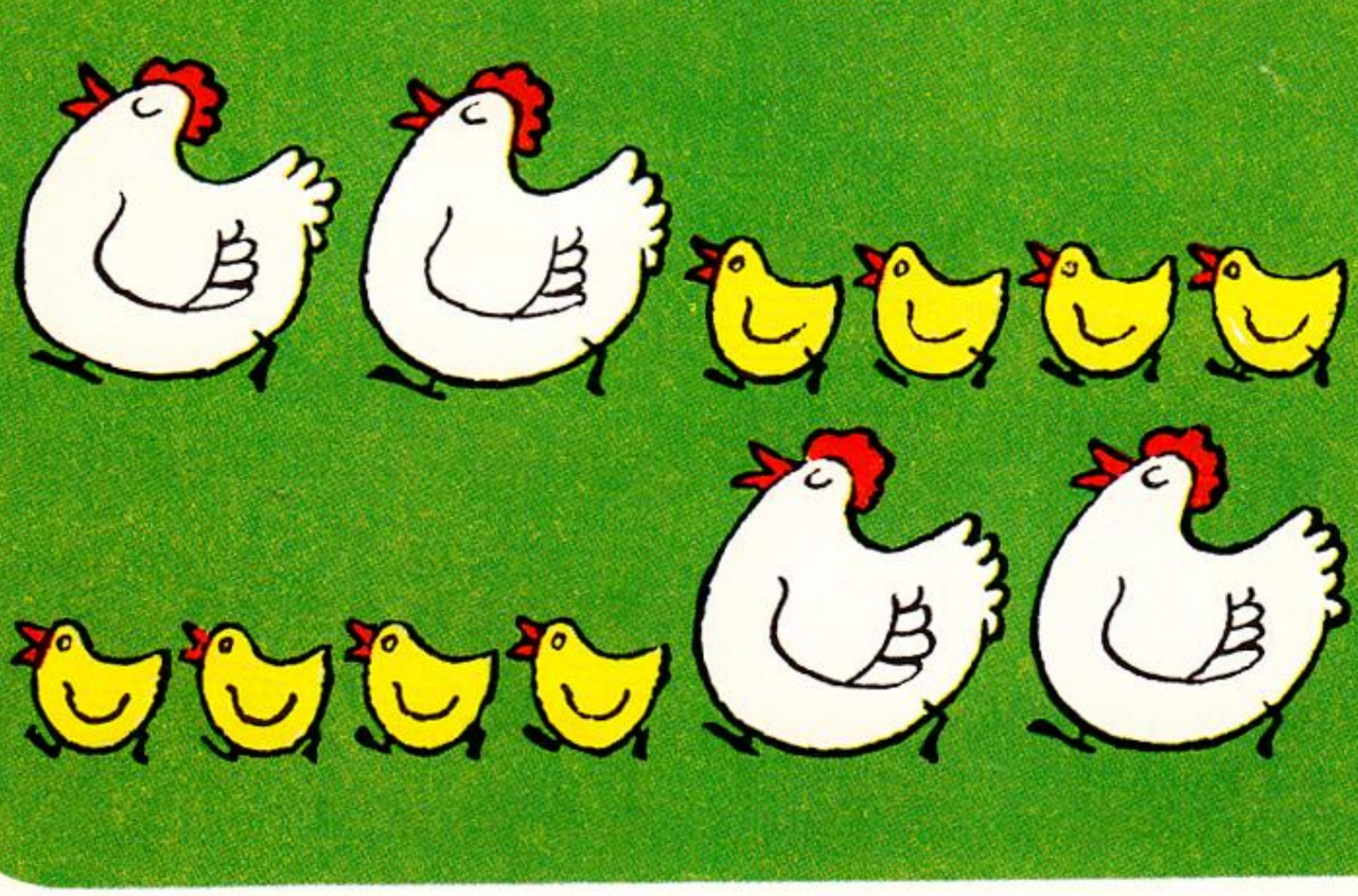




"Yes, that's quite right," said Daddy. "Two numbers can be multiplied in any order. The result is the same."

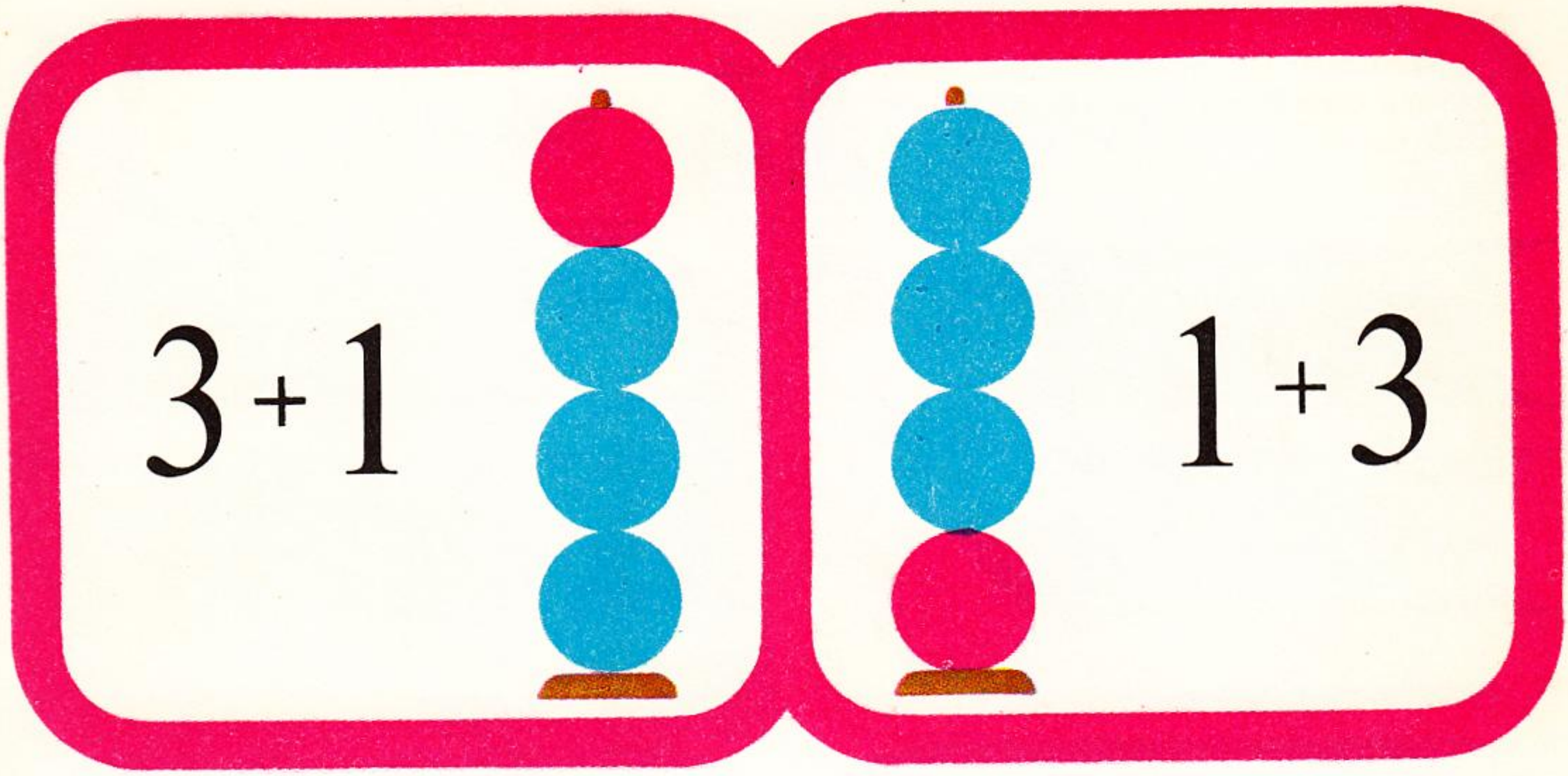
"And adding! Can you add in any order too!"

"Yes. If you take two numbers it makes no difference which you add to which. The second to the first or the first to the second. The result is the same. Look at the pictures and then write the sums in your notebook, first one way and then the other."



$2+4$

$4+2$



You write these sums in your notebook too.

This is what Petya wrote in his notebook.

2+4 = 4+2
3+1 = 1+3

"Can we go on multiplying and adding!" he asked Daddy.

"Here's what I think we should do," Daddy suggested. "I'll give you some exercises to do. You work on them and I'll check how you're getting on."

EXERCISES EXERCISES

56

1. What are these numbers?

2. What is this sign?



What other sign can be used for the same purpose!

3. Find the answers:

$5+0=5+1=$
$4+1=4+2=$
$3+2=3+3=$
$2+4=0+5=$

4. Find the answers:

$1+1+4=$
$1+2+3=$
$1+3+1=$
$3+2+1=$

5. Find the answers:

$5-0=6-2=$
$5-1=6-3=$
$5-4=6-5=$
$5-5=6-6=$

6. Find the answers:

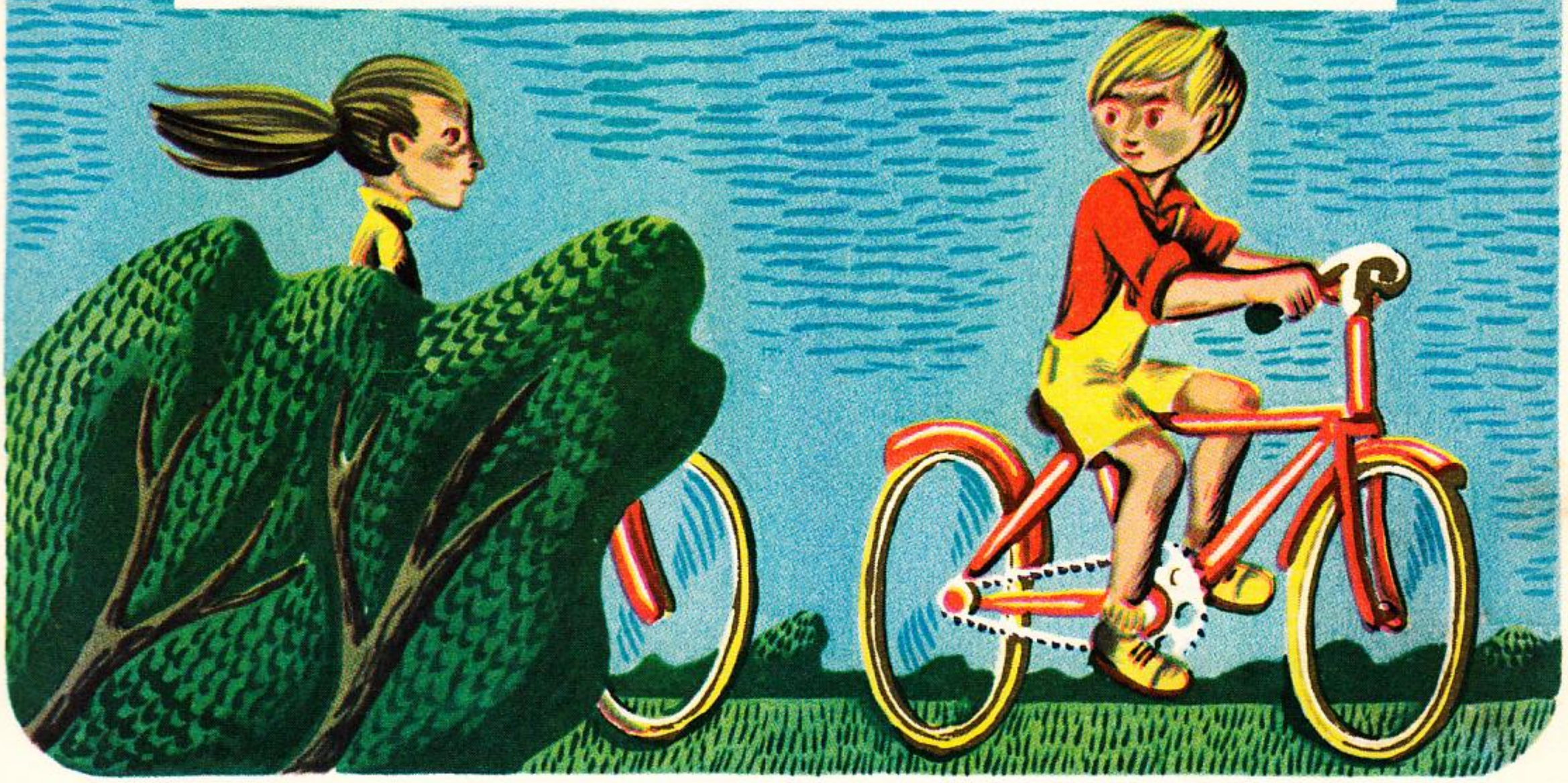
$1\times1=2\times2=$
$1\times3=2\times3=$
$4\times1=3\times2=$
$5\times1=6\times1=$

EXERCISES EXERCISES



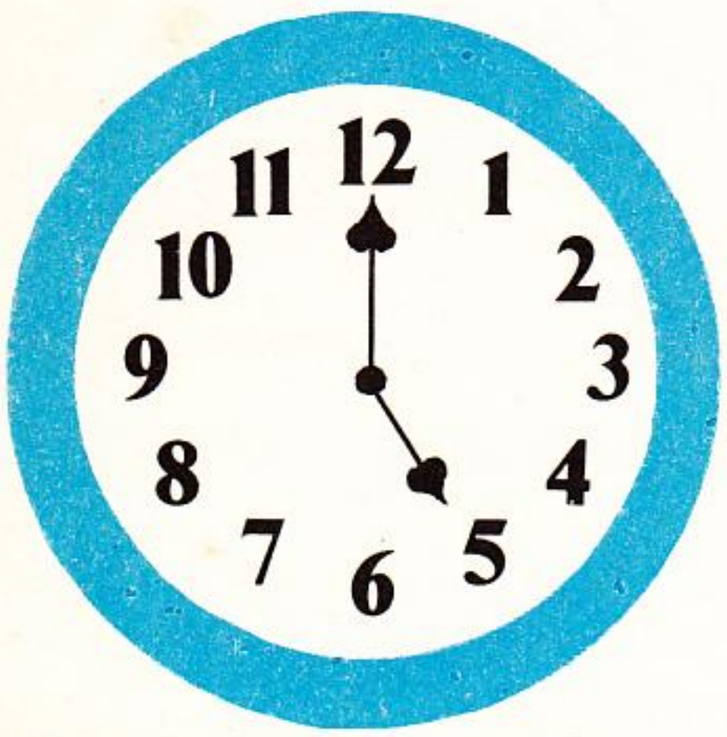
7. A postage stamp costs 6 kopecks. Igor paid for it with two three-kopeck coins. What two other coins could he have used? Which three coins make up 6 kopecks?

8. Oleg and his little sister Marina went for a ride. They rode on five wheels altogether. Oleg was riding a bicycle. What was Marina riding? Try to write the answer.

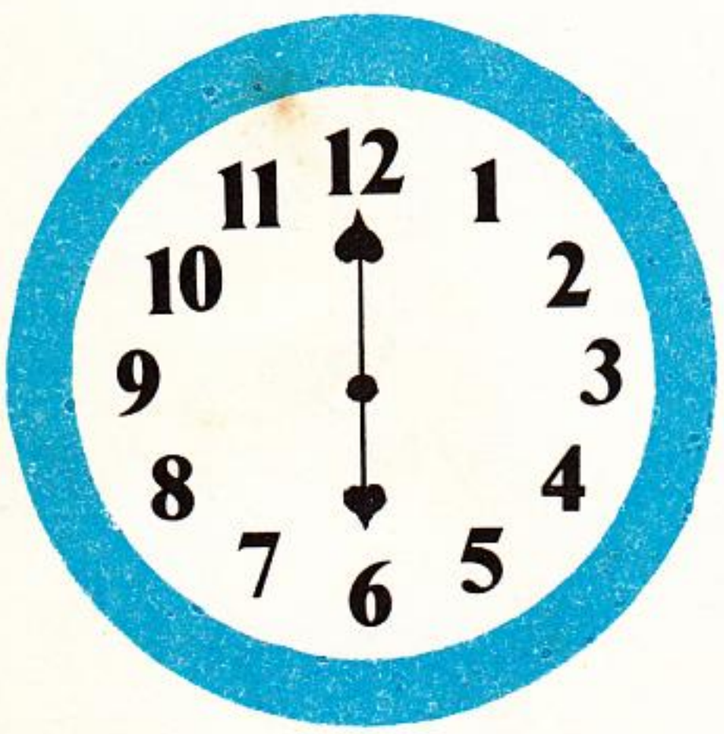


EXERCISES EXERCISES

9. When Kostya set out on his walk the time was...



When he got back it was...



Say what time it was when he left and what time it was when he got back. How many hours was he out for?

10. In the morning Mummy put six big apples in the bowl and said,



"Help yourself, Lenochka."



By dinner time there were only two apples left. How many had Lenochka eaten? Write down the answer.

EXERCISES  EXERCISES

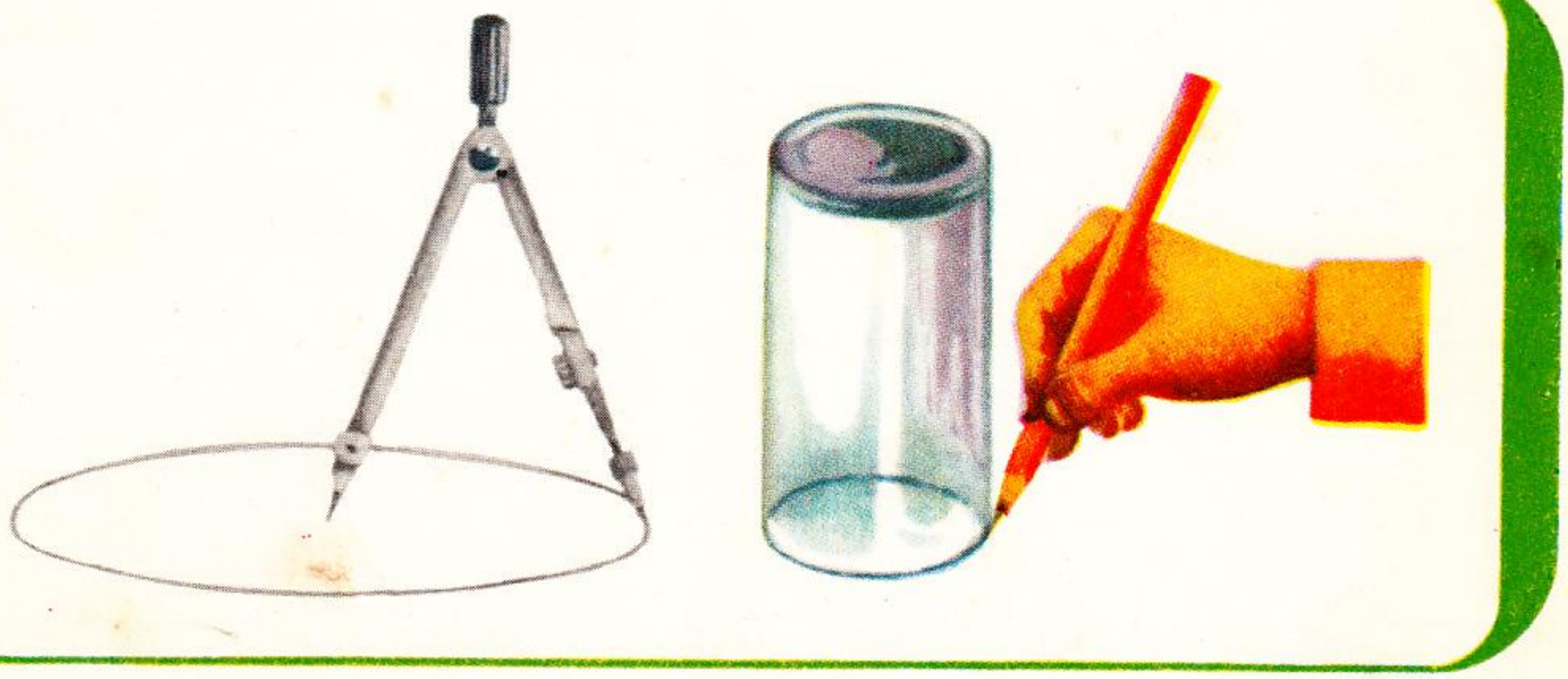
11. Find the unknown number:

$\square + 1 = 3$ $\square - 2 = 4$

$3 + \square = 4$ $5 - \square = 1$

$\square + 2 = 6$ $\square - 5 = 1$

$5 + \square = 5$ $3 - \square = 0$

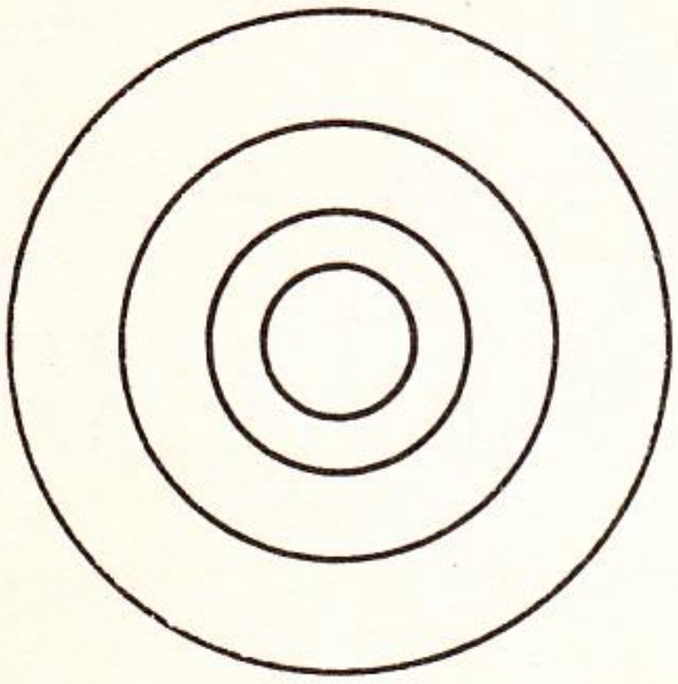


12. Draw some circles in your notebook. You can use a glass or a saucer to draw them.

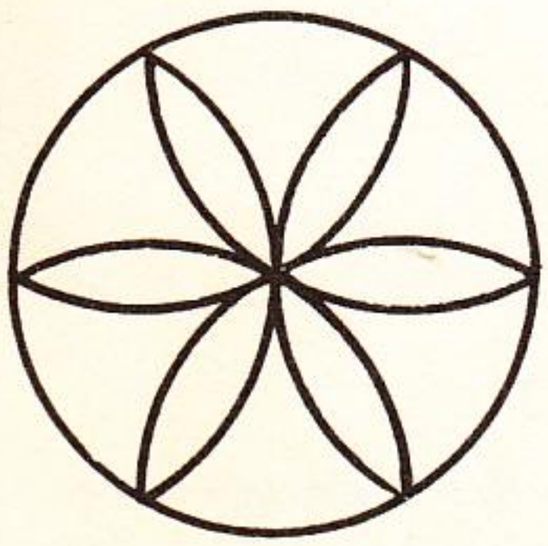
But it is easier to draw circles with a pair of compasses. Take it and draw some circles.

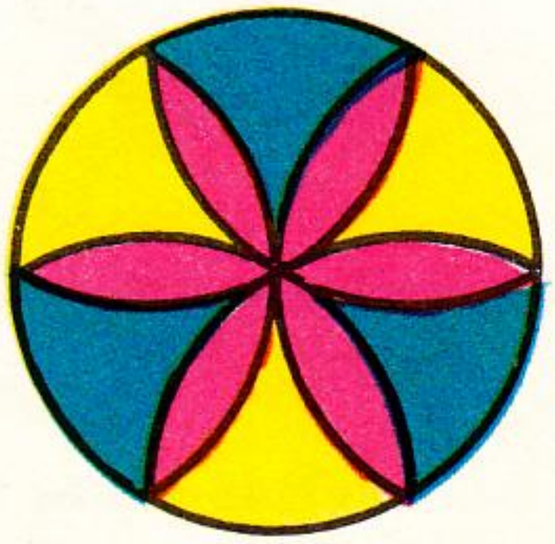
EXERCISES EXERCISES

13. If you use a pair of compasses to draw a circle, there will be a dot on the paper where the needle was. This dot is the centre of the circle. Try to draw circles of different sizes, all having the same centre as in the picture below.

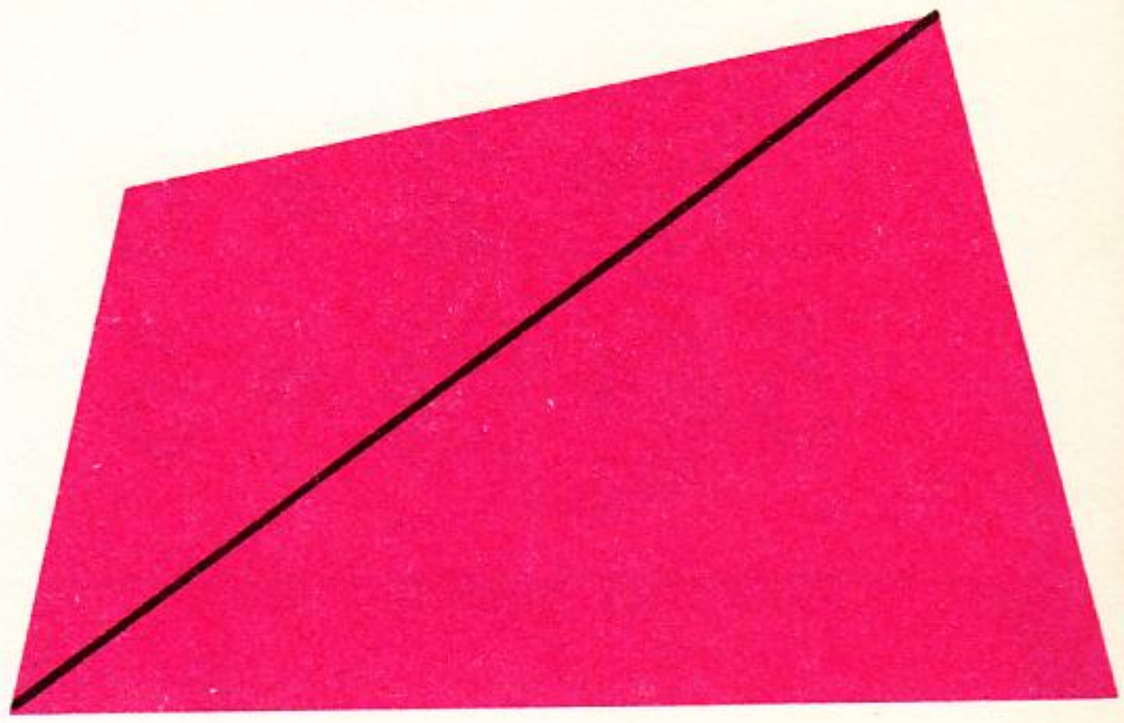


14. Try to draw the following shape using a pair of compasses. Colour it in as in the picture.

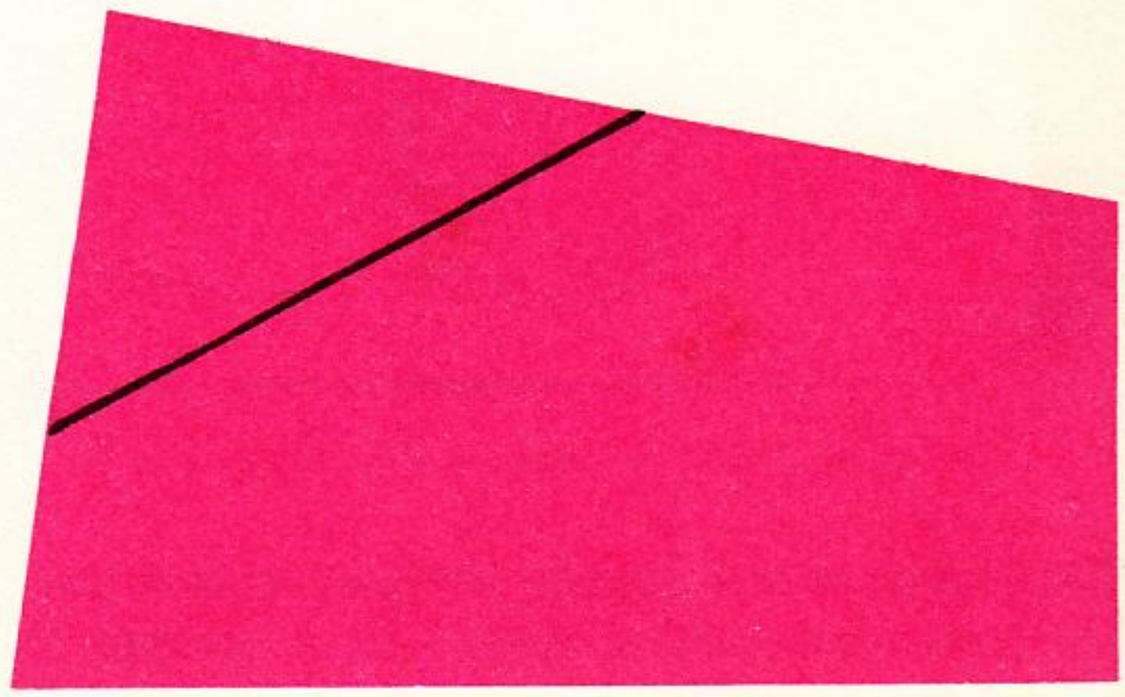




15. Cut out four quadrilaterals from some paper. Draw a line through the corners of one of them. This line is called a diagonal. When cut along the diagonal, the quadrilateral will turn into two triangles like it is shown below.

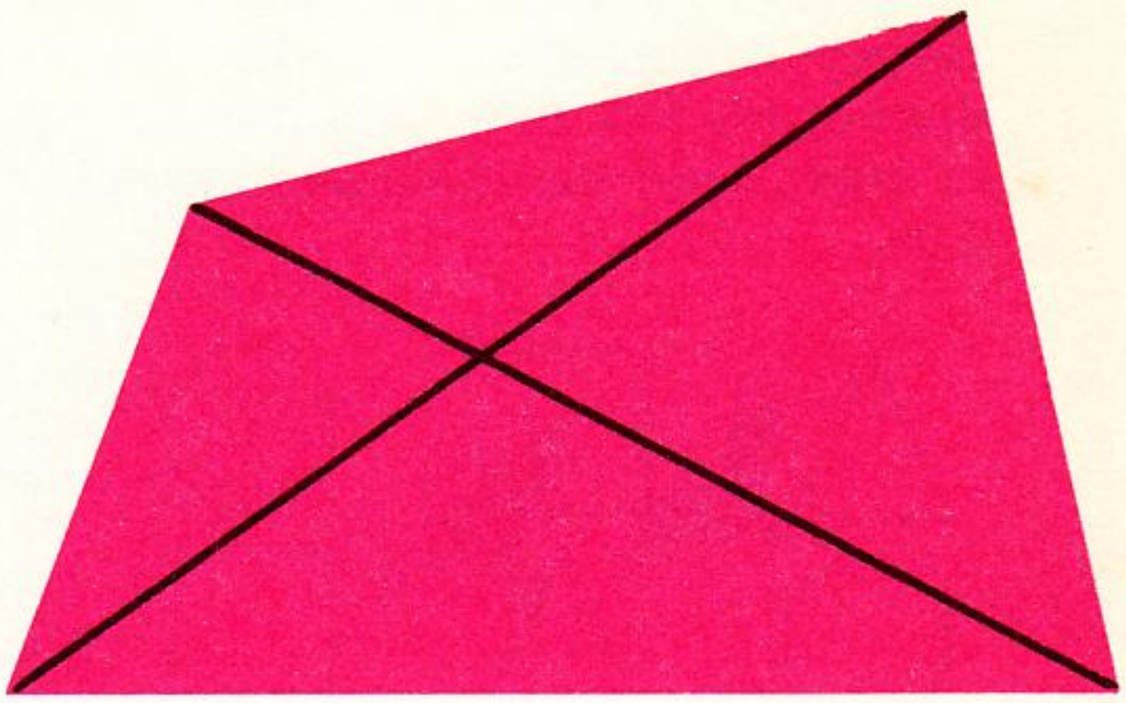


Cut the second quadrilateral along a line like the one in the picture. You will get one triangle and one five-sided shape.



EXERCISES EXERCISES

Cut the third quadrilateral so that you get two quadrilaterals. How would you draw the line?
Cut the fourth triangle so that you get a triangle and a quadrilateral.



16. **A quadrilateral can have two diagonals. Look. Now draw a five-sided shape and show how many diagonals you can draw. Count them.**

17. **Vasya caught a cold and the doctor told him to take some pills, one tablet three times a day. How many tablets will he take in two days? Write down the answer using the multiplication sign.**

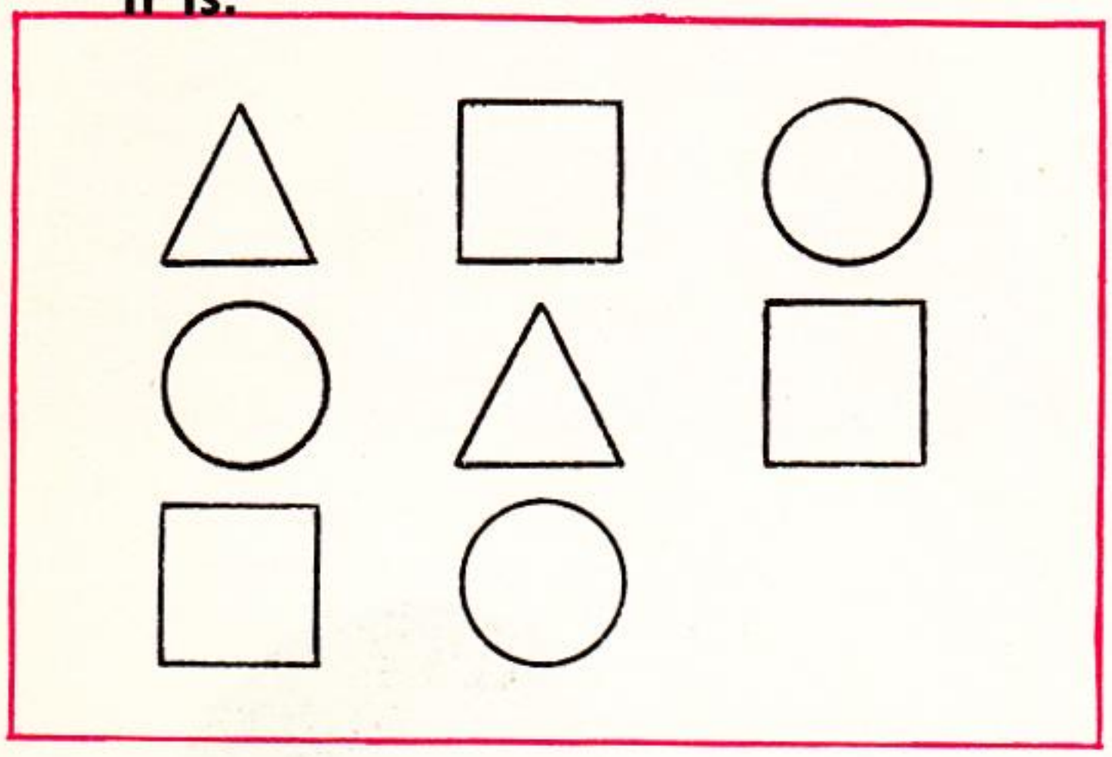


18. **Three games of chess are being played. Two people are playing in each game. How many people are playing chess altogether? Write down the answer using the multiplication sign.**

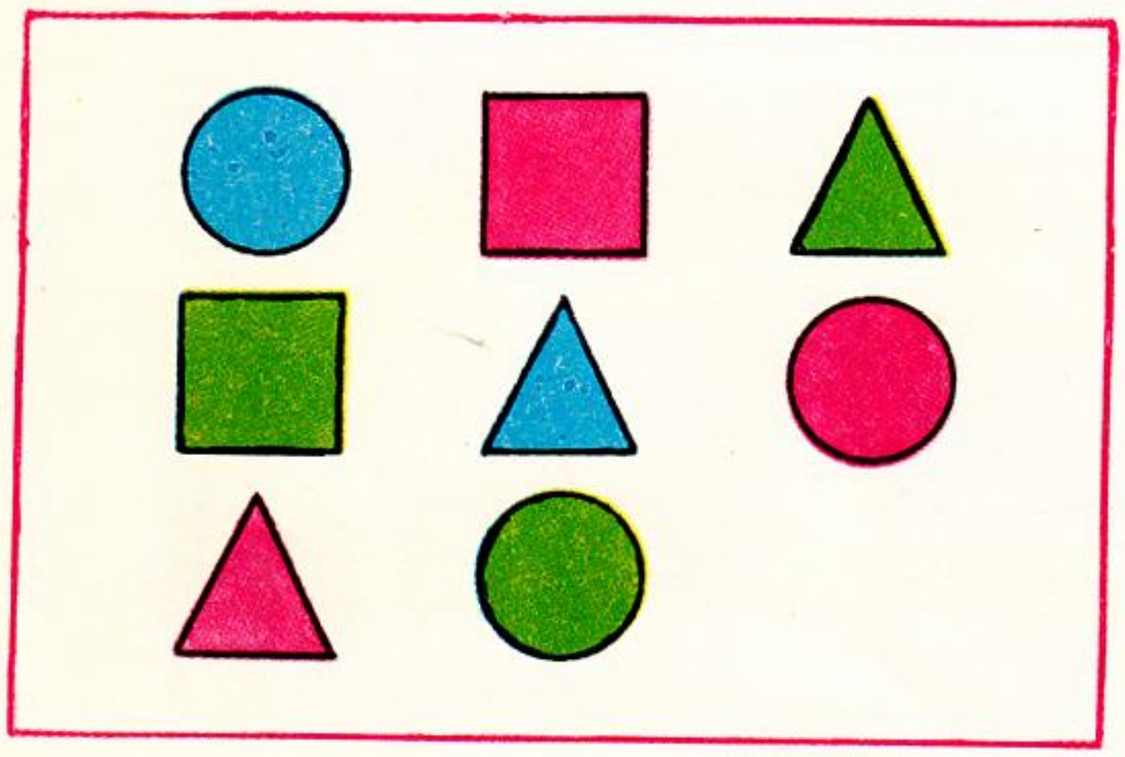


EXERCISES EXERCISES

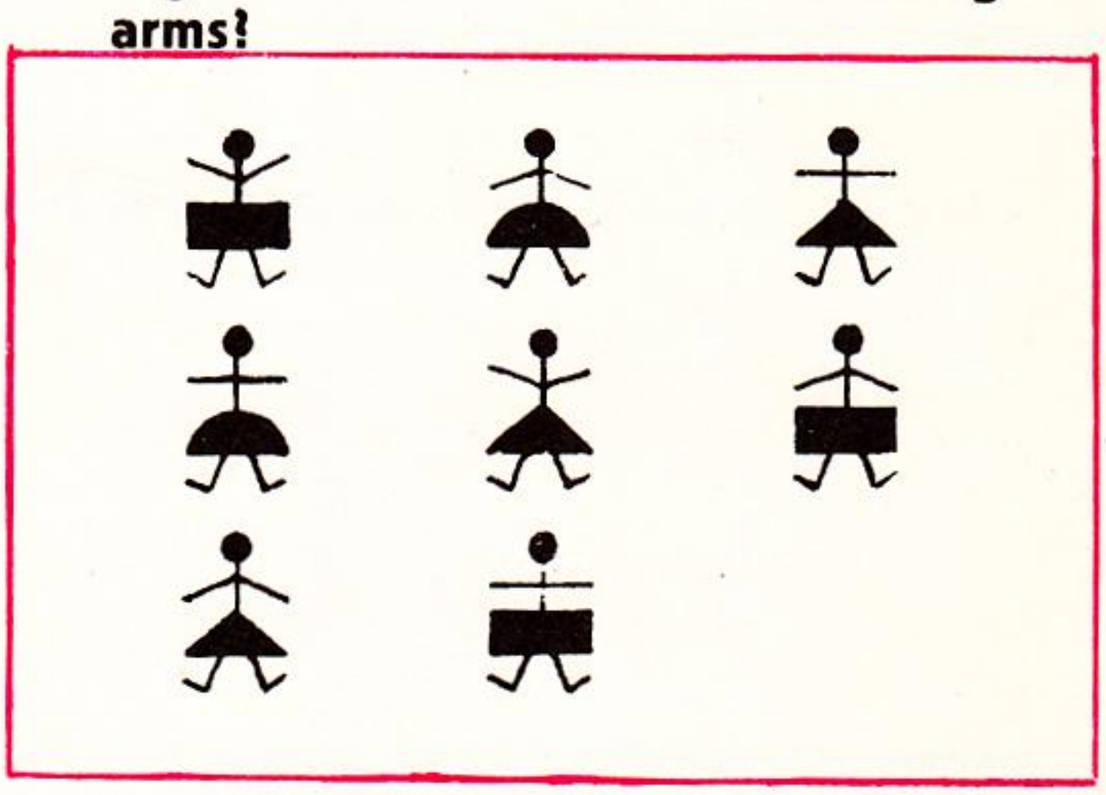
19. Grisha is drawing different chapes: triangles, squares and circles, in a certain order. Here is what he has drawn. He has only one more shape to draw. Look carefully and say which it is.



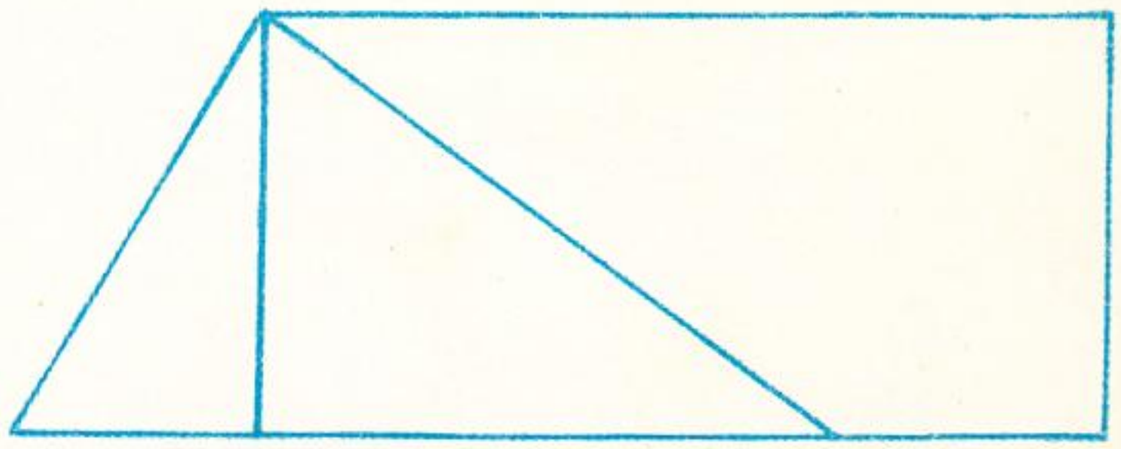
20. Grisha is still drawing shapes. This time he is colouring them in. Say what shape he still has to draw and what colour it will be.



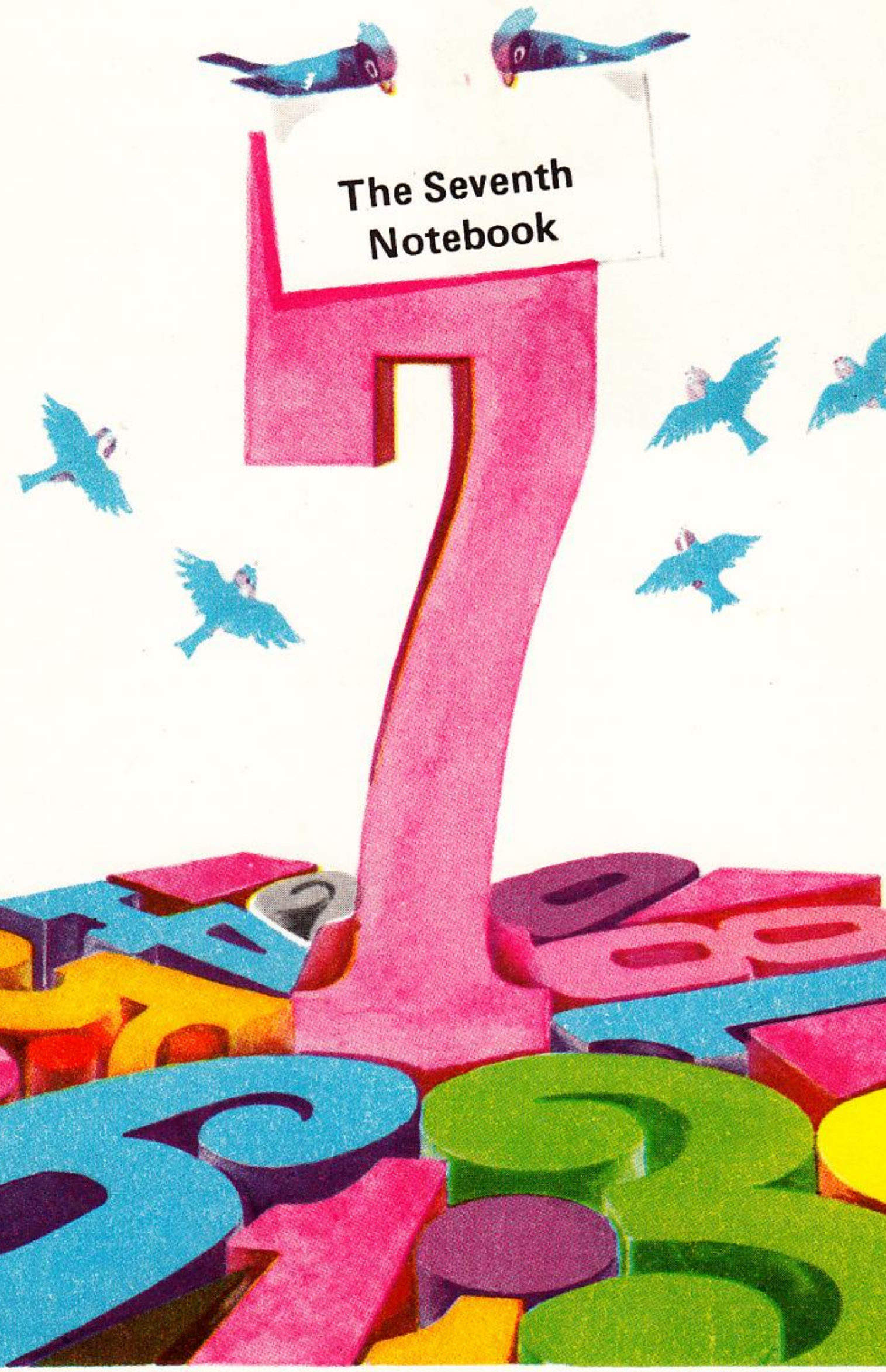
21. Look at these little people. They are also arranged in a certain order, but one of them is missing. What shaped skirt should the missing one be wearing? How should it be holding its arms?



22. There are six shapes in this drawing. Show which they are. How many triangles and how many quadrilaterals are there altogether?



23. What is the name of the fifth day of the week? The fifth month of the year? Name the sixth day of the week and the sixth month of the year.


The Seventh
Notebook



It was Sunday again. In the morning, at breakfast, Mummy, Daddy, Petya and Olya were discussing their plans for the day. Suddenly the telephone rang. Mummy answered it. First she smiled. Then, looking mysterious, she beckoned to Petya. "What's going on! I don't understand. Petya, try to find out who's speaking."

Petya picked up the receiver. "Who's speaking!" he asked.

"The Elephant."

"Where from!"

"Jungle-Town, Camel Street."

Petya laughed. "It can't be. It's only in fairy-tales animals can talk."

"Oh, yes, it can," the voice on the phone insisted. "You'll see for yourself. I'll be over soon, and Camel'll be with me. Wait." The speaker hung up.

"Who was it!" Mummy asked.

"Elephant," whispered Petya.

"Where was he phoning from!" Daddy wanted to know.

"Camel's. And they're both coming here."

Several minutes later there was a knock ot the door. The children rushed to answer it "Who is it!" they cried.

"The Elephant and the Camel," a familiar voice came back.

Mummy opened the door, and who do you think it was! Uncle Misha of course.

"Hooray!" cried Petya and Olya. "We knew it was you, Uncle Misha."

"Well, how are things! How are you getting on, children!" he asked. "How's the maths going, Petya! Do you know how to write six and seven yet!"

"I know six, but not seven."

"Would you like me to show you how to write a seven!"

"Yes, please!" cried Petya. "Here's my notebook."

"Right," said Uncle Misha. "Here we go."

7 7



Now you write
lots of sevens
in your notebook.

"Well, well," said Uncle Misha, "can you tell me how many days there are in a week?"

Do you know
how many days
there are in a week?

"I don't know," said Petya, crestfallen.

"What do you mean, you don't know? Let's see ... do you know what the first day of the week is called?"

"Monday," Petya said.

"Right," said Uncle Misha. "Let's write it down. And the second?"

"Tuesday."

"The third?"

"Wednesday."

"Well done! The fourth and fifth?"

"Thursday and Friday. And the sixth is Saturday."

"Right so far. That leaves the seventh day. Look, here's the list we've made.

1 — Monday
2 — Tuesday
3 — Wednesday
4 — Thursday
5 — Friday
6 — Saturday
7 — Sunday.

So how many days does that make in all?"

"Seven."

Did you remember
the seven days of the week?
Say them again,
one by one.

"And there are seven dwarfs," Olya said suddenly. "Do you know the fairy-tale about the seven dwarfs?"

"Of course. It's called 'Snow-White and the Seven Dwarfs'. You often meet seven in fairy-tales and nursery rhymes. There is 'The Wolf and the Seven Goats', and 'The Tale of the Dead Princess and



the Seven Knights' by Alexander Pushkin."

"We know this fairy-tale," Petya said, "Mother used to read it to us."

What other stories and nursery rhymes do you know with seven in them?



"Have you been doing any interesting sums during the week?" Uncle Misha asked.

"Lots and lots," said Petya. "I know multiplication now."

"Clever boy! Multiplication! Can you show me how to do it?"

Petya was only too delighted to explain everything. He made Uncle Misha sit down at the table, put a notebook in front of him, gave him a pencil and, sounding very serious indeed, began: "We're going to do a sum. A daddy has two children. He gives them three sweets each. How many sweets does he give them altogether? You have to do that sum and write down the answer. Only you have to do it by multiplication."

Can you do Petya's sum by multiplication?

"But I can't do multiplication! You'll have to show me how," Uncle Misha smiled.

"There are two children," Petya repeated, explaining. "They have three sweets each. So the number of sweets they have altogether is three times two. D'you understand, Uncle Misha?"

"Yes."

"And do you know what three times two is?"

"Six."

"Then write it down. Three twos are six. The daddy gave six sweets to the children."

"Well done," said Uncle Misha. "I see you're good at multiplication. But what about division? Can you divide?"

"What do you mean, divide?" Petya inquired. "What does divide mean? Sharing out sweets?"

"Yes, you can divide sweets. Let's take the sum you made up about sweets and turn it into a sum for division."

Petya and Uncle Misha swopped places. Petya sat down while Uncle Misha told him the sum. "A father has two children. He divides six sweets between them equally. How many sweets do they get each?"

Now you work out this sum.

Petya became thoughtful. It did not look easy.

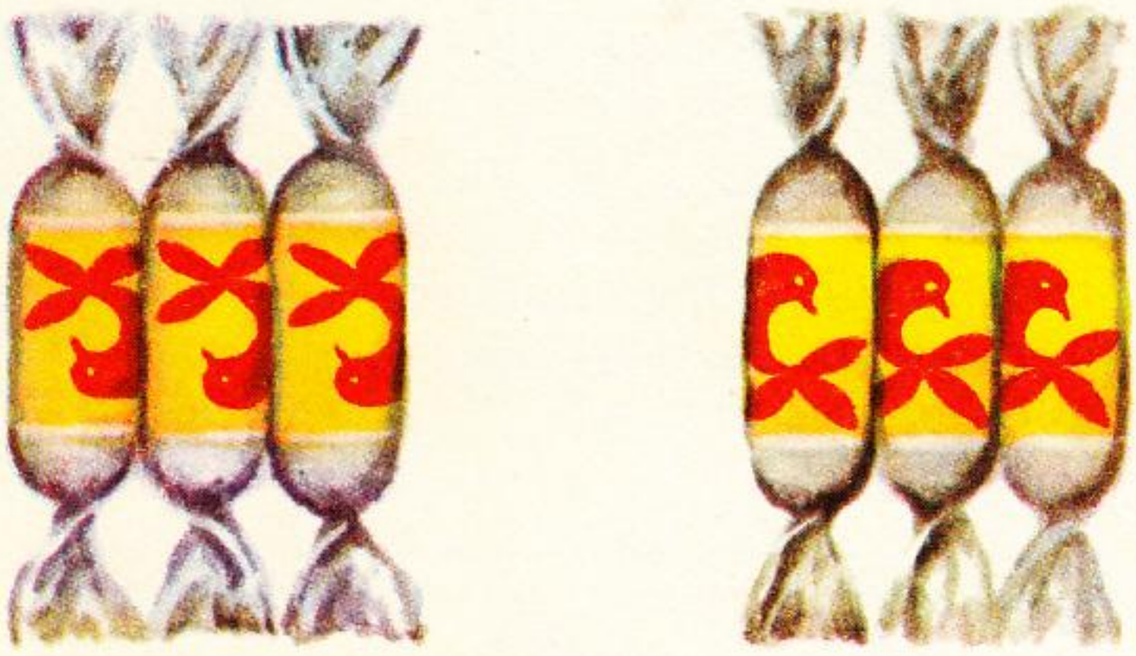
"Why not ask Daddy to give us six sweets?" suggested Uncle Misha. "The sum will be easier then."

"Daddy," Petya called. "Will you give me and Olya six sweets?"

"Why so many?" Daddy asked in surprise.

"They're for maths," explained Petya. "It's a sum. We have to divide six sweets between us equally."

"Well," Daddy agreed, "as long as it's maths. Here you are. Six sweets. Divide them up between you."



Petya put the sweets on the table. "Each child has three sweets," he said. "But how do we write it!"

$$6 \div 2 = 3$$

"Here. Watch. Six divided by two gives three. You say it now."

Repeat what Uncle Misha said and write it in your notebook.

Petya repeated it, then said, "I see. Two dots separated by a horizontal line mean 'divided by'. Right!"

"Right," agreed Uncle Misha. Then he hesitated. "You're on the ball, Petya. You've understood the two dots. But I'm not, am I! I've been left out. I haven't got any sweets." He pretended to be upset.

Olya climbed onto his knee to comfort him. "Don't cry. We'll share our sweets with you."

Uncle Misha cheered up at once. "Can you share out six sweets between the three of us!" he asked Olya.

"Of course I can." And Olya divided the sweets into three little piles just like in the picture.

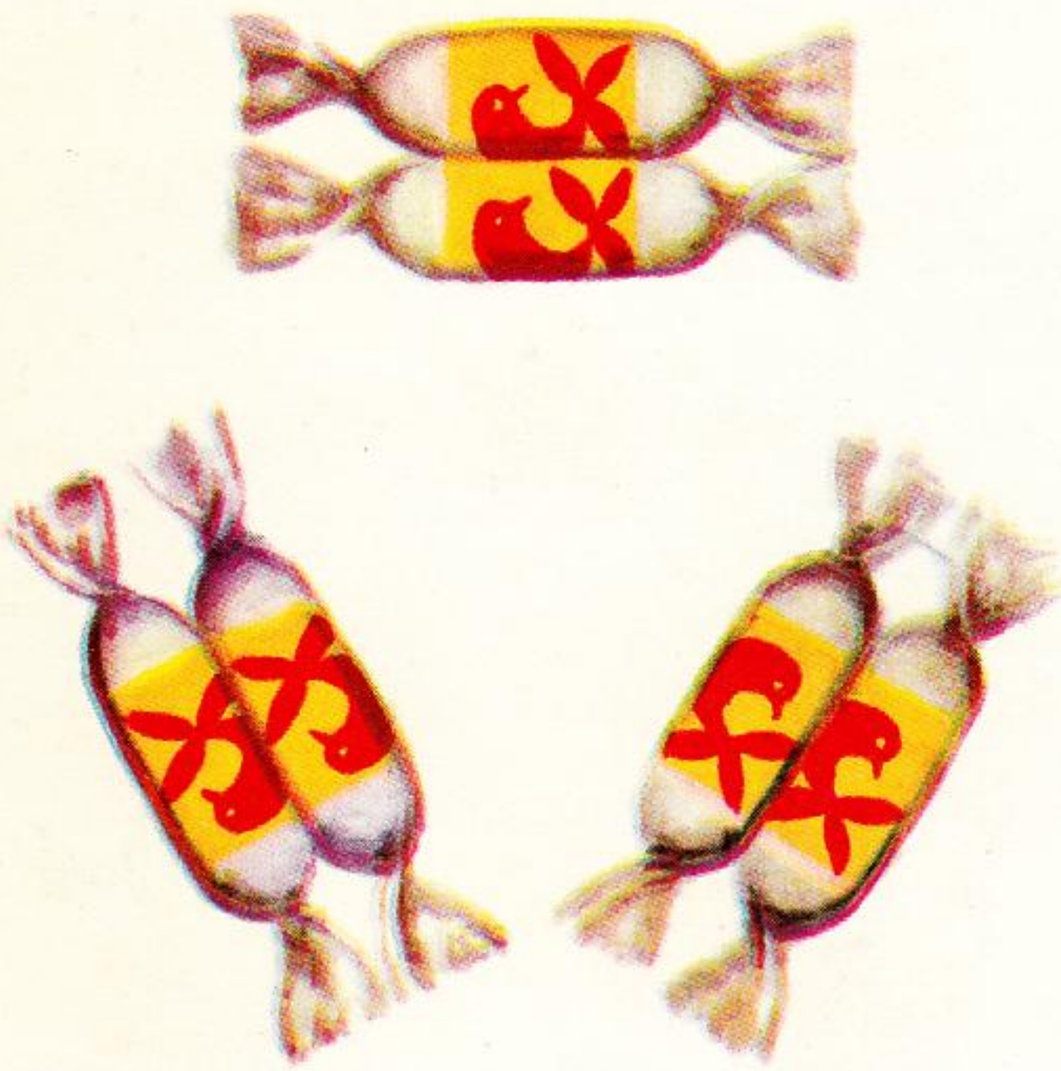


Did she divide them up correctly!

"No!" cried Petya. "That's wrong." He put his hand out to rearrange the sweets but Uncle Misha stopped him.

"You see, Olya," he said, "when people say share, or divide, they usually mean share out equally. But you've given me three and only left one for yourself. Let's try and sort it out, shall we? How many sweets shall we have each if we all have equal shares?"

Olya thought for a moment and then arranged the sweets again.



"That's more like it!" said Uncle Misha. "Two sweets each. Now, Petya, write down the answer to the sum."

You write down the answer too.

Petya wrote it.

$6 \div 3 = 2$

"Well done! You're getting the hang of it. Now tell me what this makes."

$5 \div 5 =$

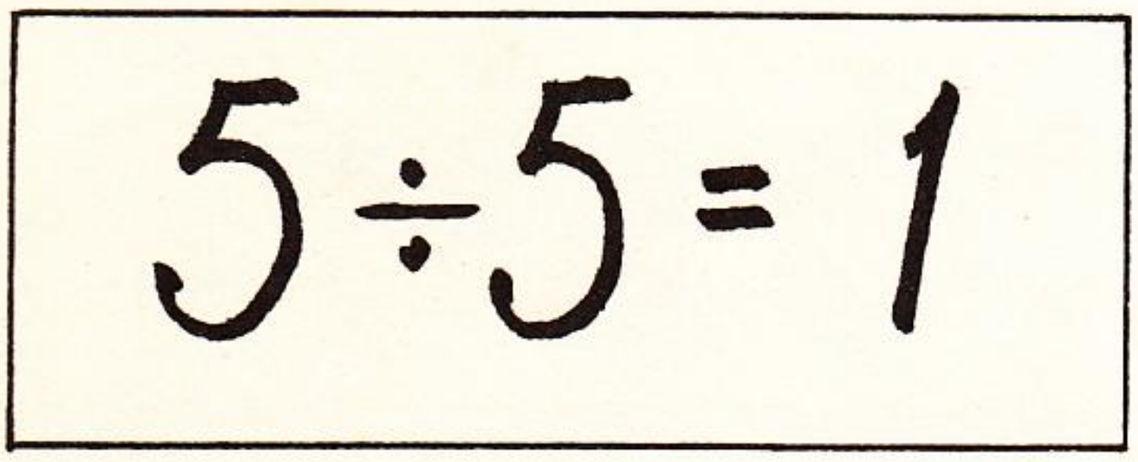
He put a sweet on one side and placed the rest in front of Petya. "Here's what the sum's about. There are five sweets and they have to be divided equally among five people. How many will they have each? Count them and write down the answer."

You do Uncle Misha's sum too.

"But who are the five people the sweets have to be divided among?" Petya asked.

Uncle Misha shrugged. "That doesn't affect the way you do the sum, does it? The answer doesn't depend on who's to get the sweets. But if you really want to give them to someone, then there are Mummy and Daddy for a start. If you count them, there are five of us."

Petya divided up the pile of five sweets into five, saw how many that made for each of them and wrote down the answer in his notebook. The sum was now complete.



"I've done it," he said.
"What's the answer?"
"Here it is. Look."

Is Petya's answer right?
How many sweets
will each person have?

"Good man," said Uncle Misha. "We don't need the sweets now, though, so let's give them back to Daddy." He was on the point of picking them up when he paused. "But there were more sweets than this," he said. "There's one missing. Where is it?"

"I've got it," said Olya. "Can we divide this one too?"

"You can't divide one sweet..." said Petya. "I know," he went on. "You have the paper and I'll have the sweet."

"What an idea!" Uncle Misha laughed. "That's clever. Why don't we try dividing an orange like that? You have the peel and Olya can have the fruit. What d'you think?"

"N-no," Petya said slowly. "No. That's not fair."

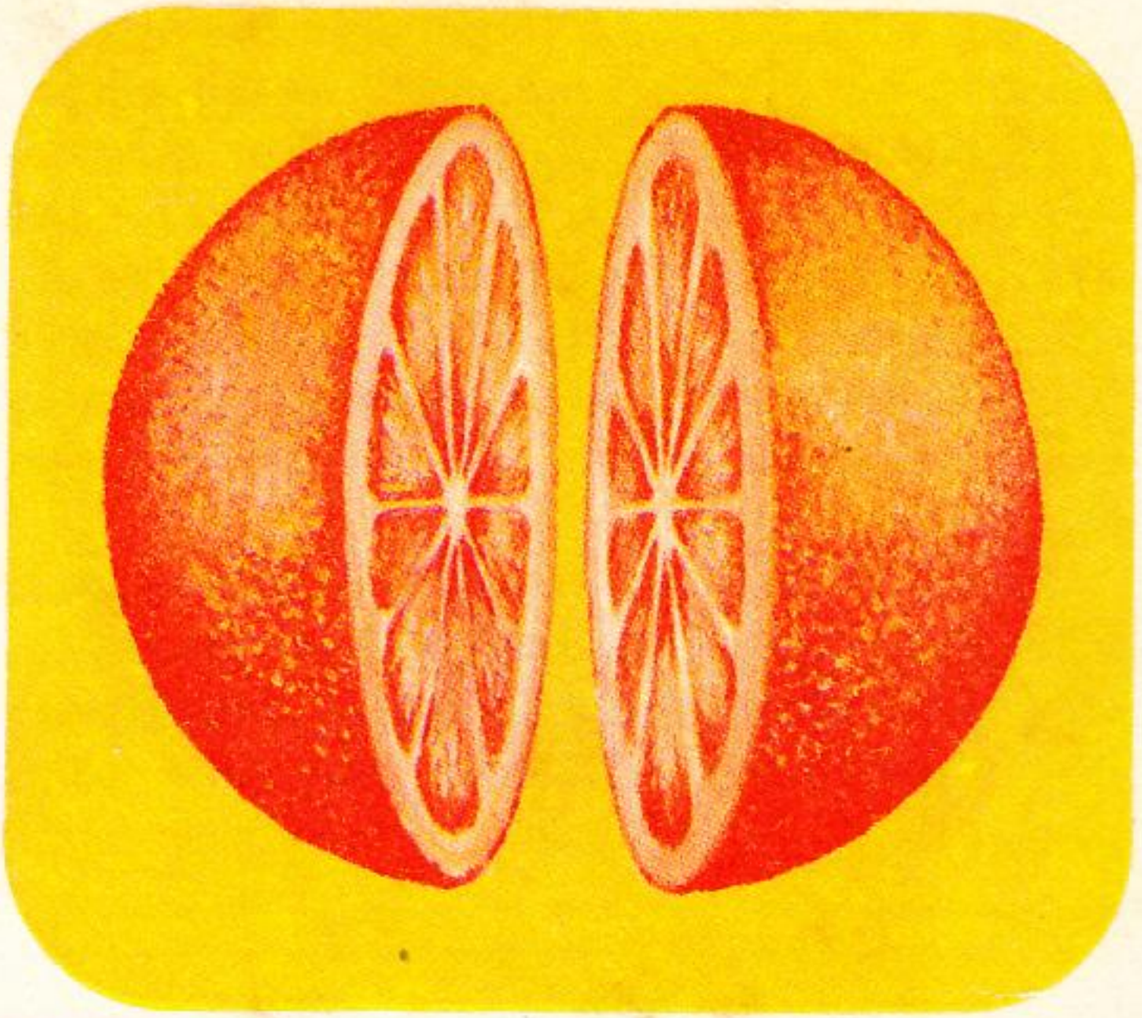
"So... You're not so keen. That'll teach you a lesson, Petya. You mustn't cheat. However, we might as well get an orange now and divide it properly—into two equal parts." He took an orange from the fruit bowl and cut it in two, just like in the picture. "Right! Here's one half, and here's the other. This is yours, Olya. And here's yours, Petya."

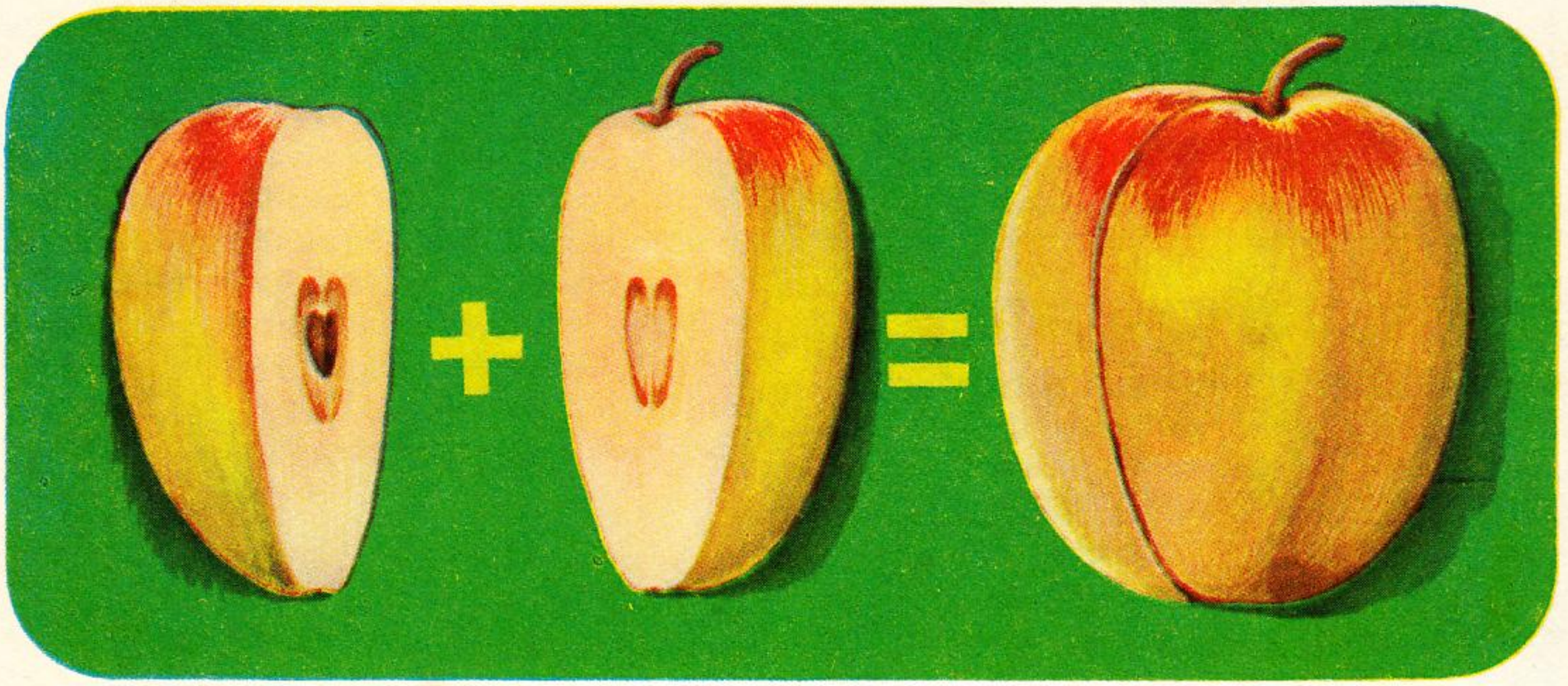
"Let's divide some more things in two," said Olya.

"OK," agreed Uncle Misha. "We'll cut an apple in half. Or in two, as you say. Here we are. Half each."

"Hang on," said Petya. "Give both halves to me! I'll show you a trick. Here are two halves. Abracadabra! It's an apple!"

Olya clapped her hands.





"How lovely! Now make it two halves again, Petya."

"There you are!" cried Petya, holding half in each hand. "Two halves. Here's yours."

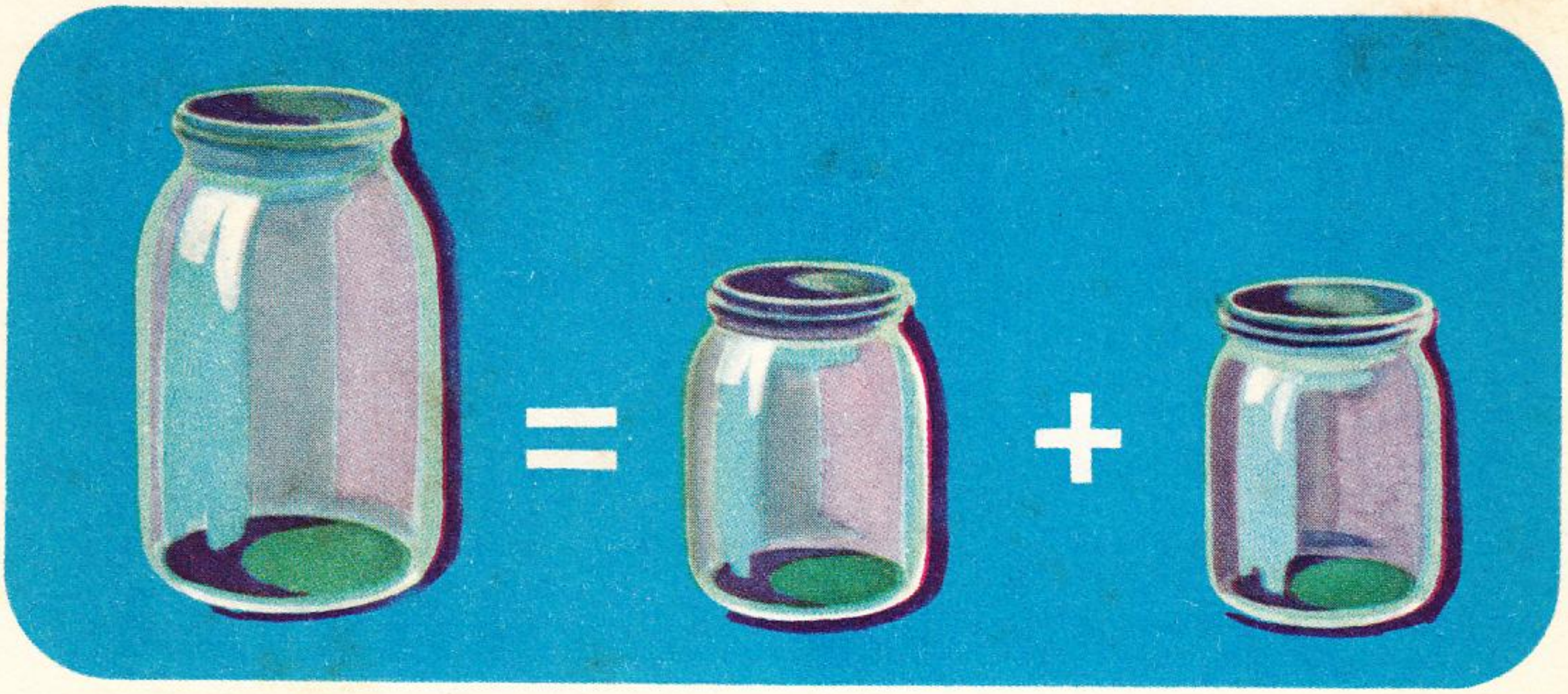
The children tucked into their fruit. Olya nibbled slowly but Petya quickly finished his. "Are there any other halves for me?" he asked in a greedy voice.

"What about half of this bread?" suggested Uncle Misha.

"No. Not half a loaf."

"Half a pint of milk?"

Petya laughed. "Can you cut a pint in half?"



"I can divide it in two. You don't cut it, though, you pour it. You pour the milk from a pint bottle into two half-pint bottles. Would you like to try?"

"I don't want any milk," said Petya.

"But then how can we divide a pint into two half pints?" asked Olya in dismay.

"It doesn't have to be milk," said Uncle Misha. "We can use water. Where do you keep your empty bottles and jars?"

When he had found them Uncle Misha gave the children a half-pint jar each and took a pint bottle for himself. He filled it with water and then emptied it into the jars. Then the children poured the water from their jars back into the bottle.

Now you get a pint bottle
and two half-pint jars
and do the same thing.

"That'll do for the moment," said Uncle Misha. "Haven't we been indoors long enough? Why don't we go to the park?"

"Hooray!" cried the children.

"Will Daddy and Mummy come too?" Olya asked.

"No," said Uncle Misha. "They've got lots to do today. We'll go on our own."

It was very noisy and cheerful in the park. The roundabout, dodgems and swings were all in action. Olya tugged at Uncle Misha's hand. She could hardly wait to go on the roundabout. But Petya wanted to ride in a dodgem car.

"All in good time," said Uncle Misha. "If you go on pulling me in opposite directions I'll be divided in two. We'll start with the swings and we can talk about our maths at the same time."

"What is there to do with maths in the park?" Petya asked.

"There's maths everywhere; you just have to learn to see it. Look at the roundabout, for instance. What shape is it?"

"It's a big circle!" cried Petya. "And the merry-go-round is also a circle."

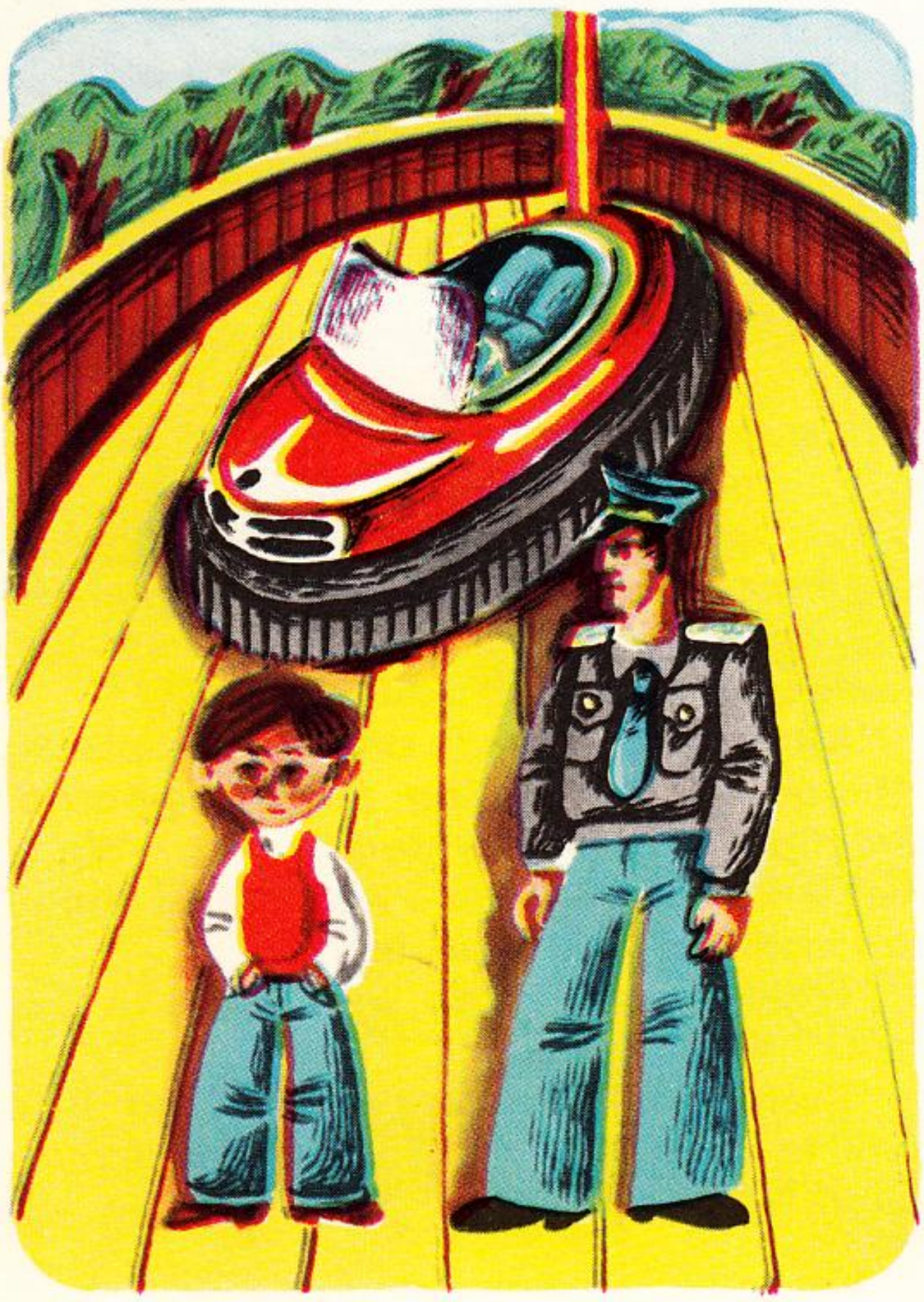
"Exactly. And we can do a sum about the dodgems."

"How?"

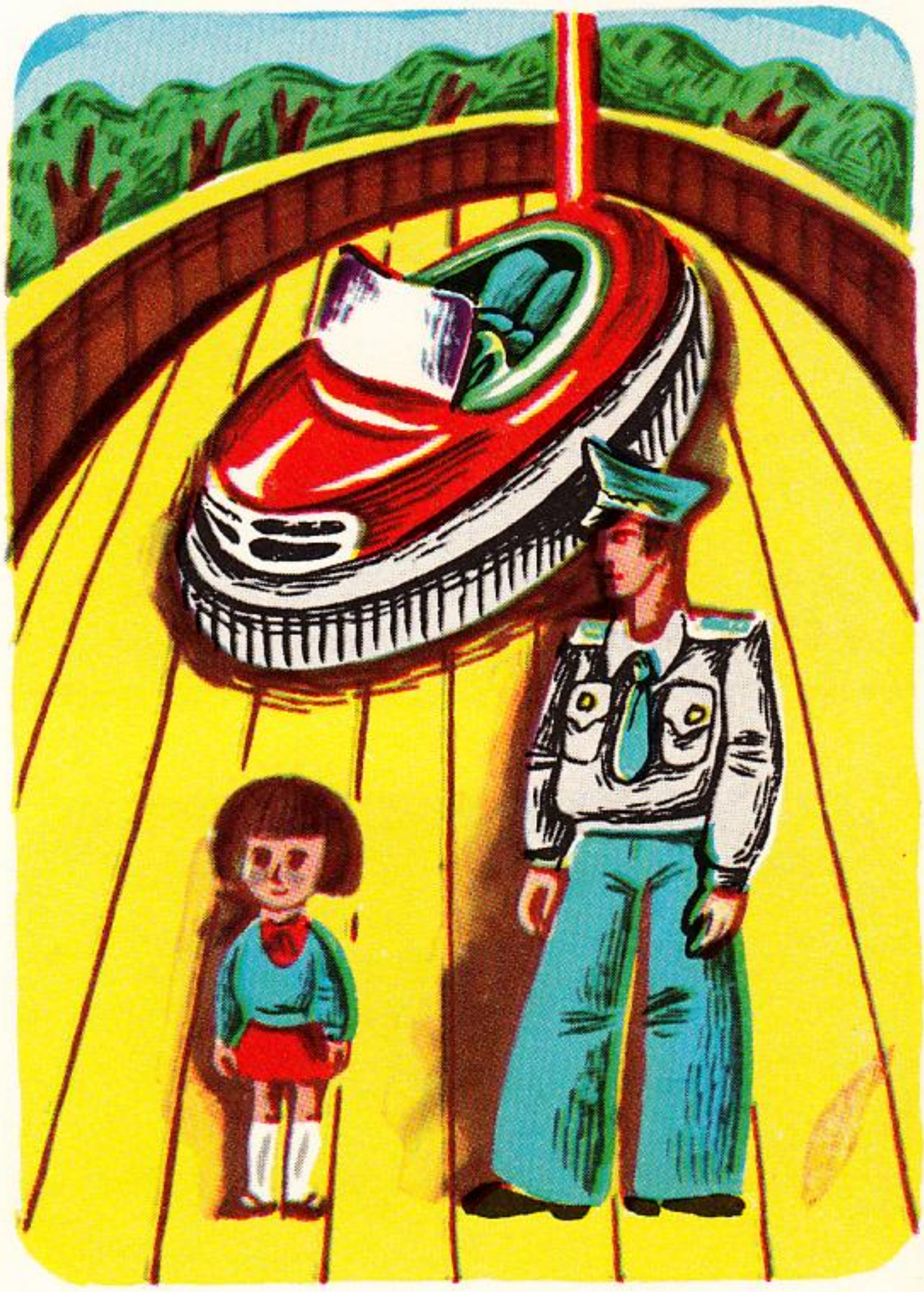
"Listen. There's room for two people in each little car. But there are three of us. So here's the first question. How many different pairs can the three of us make up to go in a dodgem? And here's the next one. How many tickets shall we have to buy?"

You try to answer Uncle Misha's questions too.

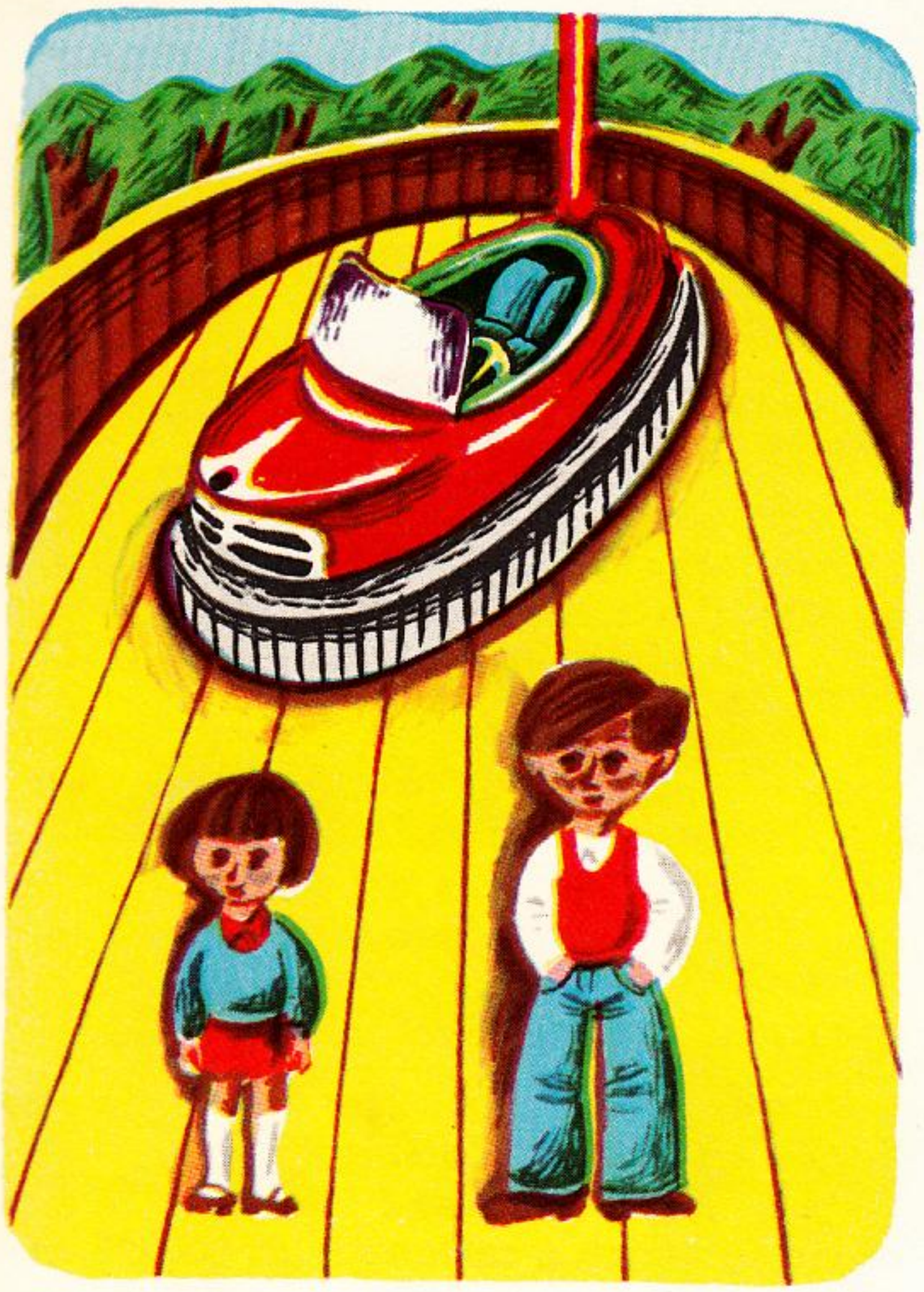
"The first pair is me and Uncle Misha," Petya said.



"And the second pair is *me* and Uncle Misha," said Olya.



"The third pair is me and Olya," continued Petya after some thought.



"And what about the fourth pair?"

Again Petya was thoughtful. "But there isn't a fourth pair," he said at last.

Is he right?

"Well done!" said Uncle Misha. "Now the second question. How many tickets do we need?"

"That's easy. Each pair needs two tickets. There are three pairs altogether. So we'll need three times two tickets. Three times two is six. So we have to get six tickets."

"Good," said Uncle Misha.

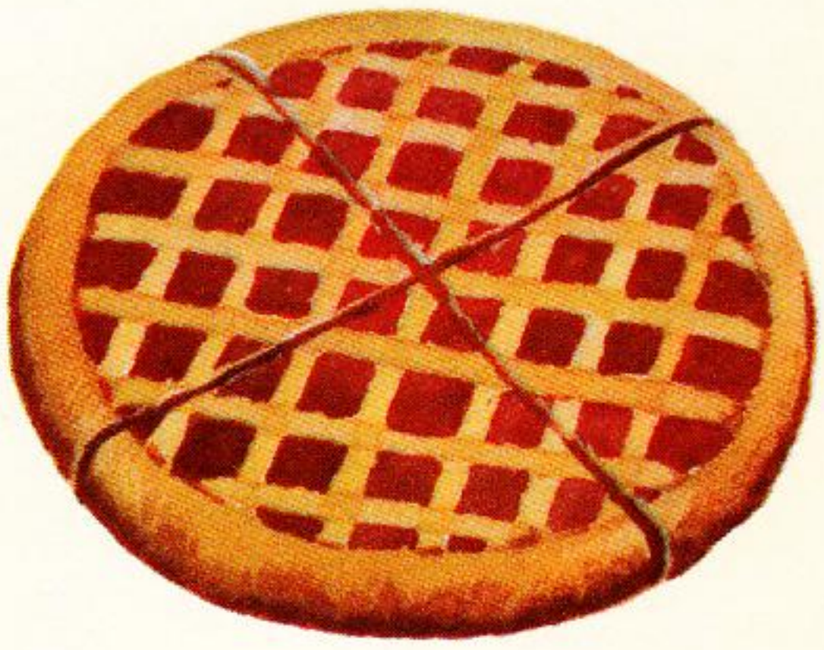
After the dodgems they visited lots of other attractions. They really enjoyed themselves and were soon tired and hungry.

"It's time we had a snack," said Uncle Misha. "Here's the cafeteria. You find a table and I'll go and get some pie."

"Look," he continued, when they were all sitting down, "I'm going to cut the pie in two. And now I'm going to cut the halves in two."

"What's half a half called?" Petya wanted to know.

Do you know the name for half a half?



"A quarter," said Uncle Misha.

"Ah," said Petya. "The whole pie has four quarters, hasn't it?"

"Yes, that's it. A quarter is what you get when something whole is divided in four equal parts. Here's another example. There's a piece of wire on the floor. Pick it up and straighten it out. Now break it in two.

And now I'll break each half into two equal parts. Now we've got four quarters.



There you are.
They're all the same length."

Take a piece of wire or string and try to cut it into four exactly equal parts.

Uncle Misha got up. "Time to go home," he said. "Coming?"

"All right," agreed Petya. "We're going to watch a cartoon with Daddy and Mummy. Would you like to watch it with us too?"

"I'd love to," said Uncle Misha.

HOW LYAPA THE DONKEY PLAYED FOOTBALL

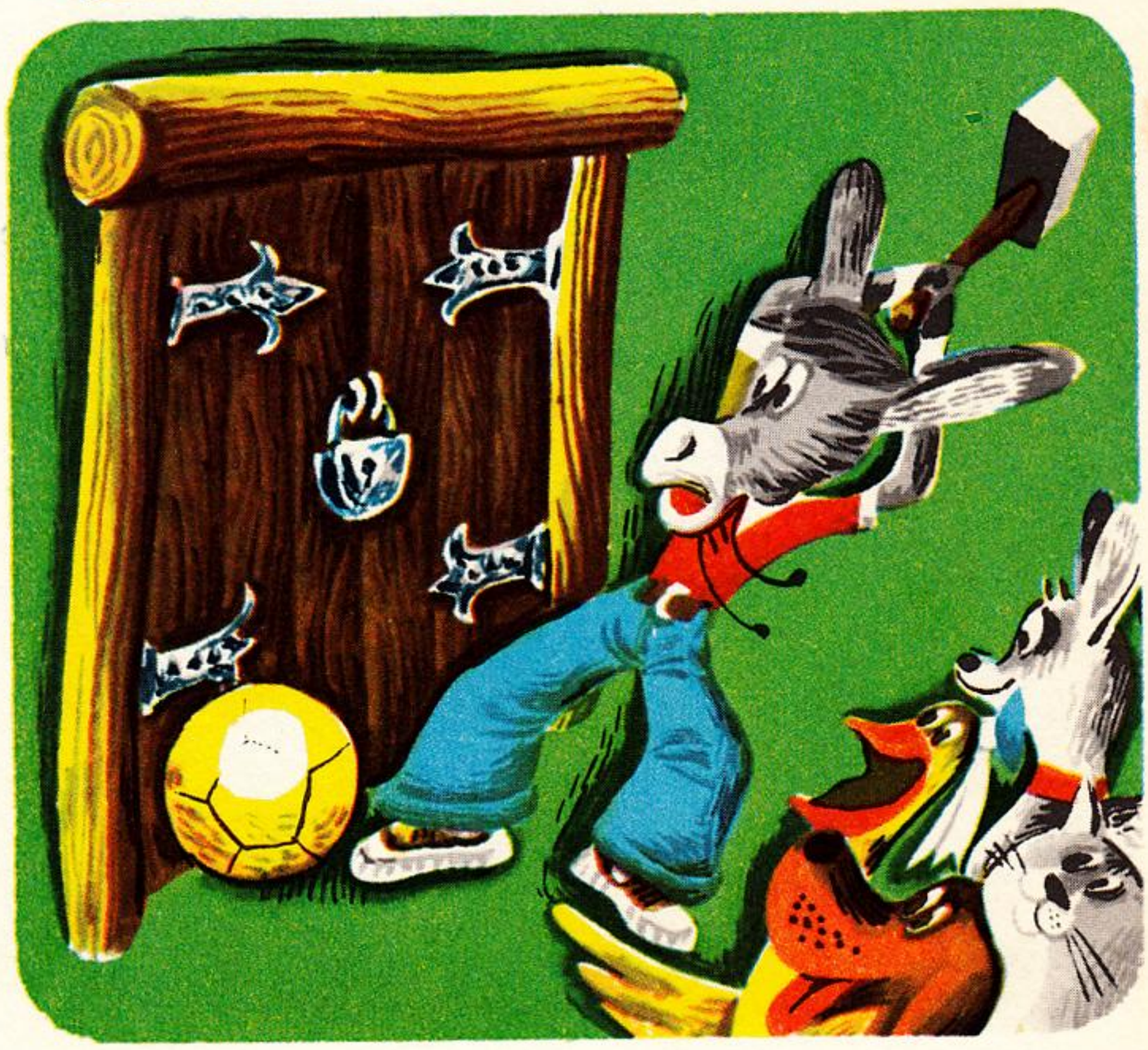


LYAPA: Look, I've made some posts, Puppy.

PUPPY: What do you want those for?

LYAPA: We're going to play football so we'll be notching up a score.

PUPPY: How are you going to notch up a score with posts like those?



LYAPA: With a chisel.

ALL: Ha ha! Lyapa's mixing everything up as usual.

DUCKLING: Where did you ever see a game like that, Lyapa?

LYAPA: I've never seen one, but I've heard people talking about notching up a score.

KID: Oh, Lyapa! In football you kick the ball past the goalpost. But your posts are all wrong.

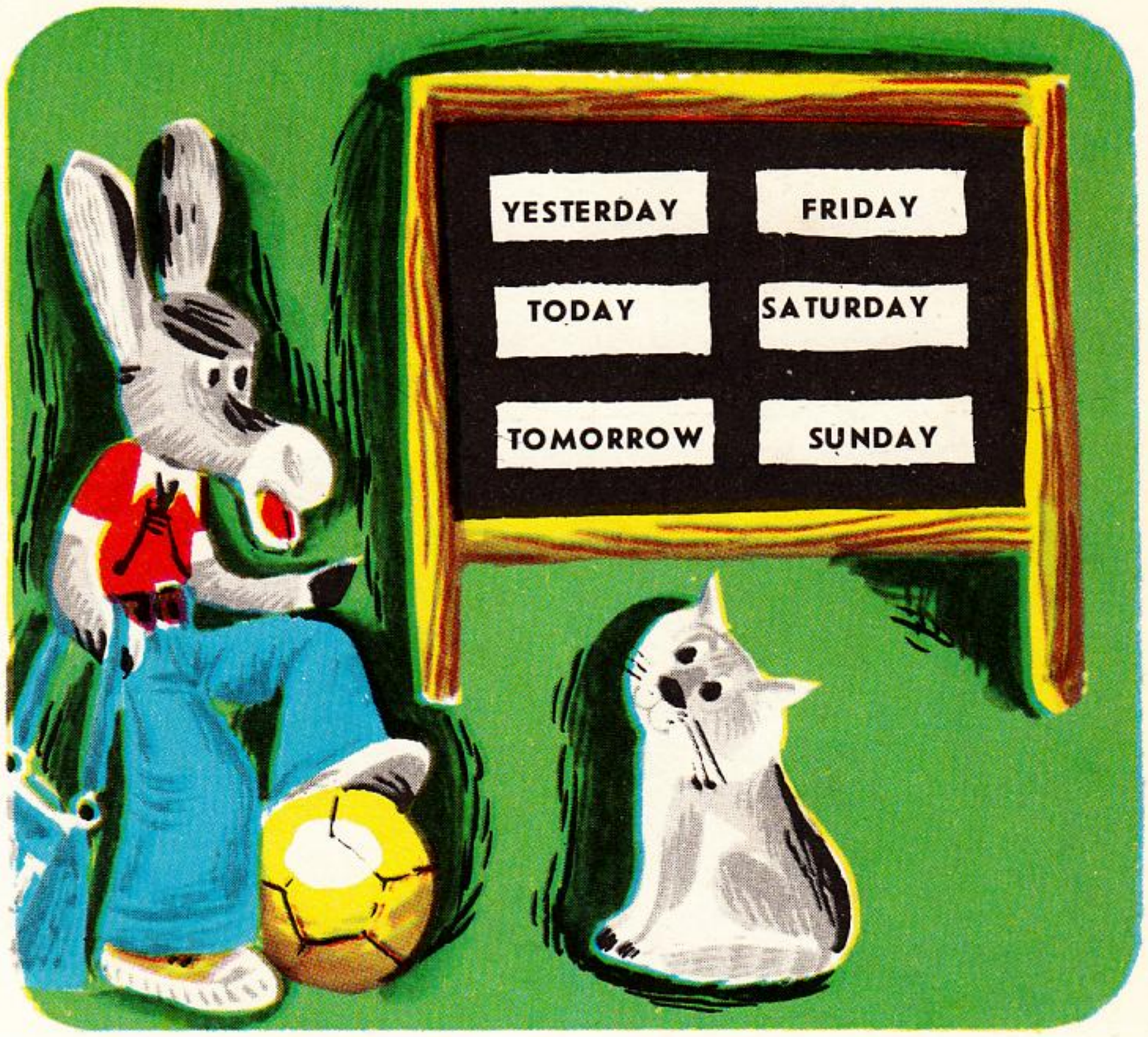


LYAPA: Well, then, let's build the right kind of posts today for the football we're playing yesterday.



KITTEN: What are you talking about, Lyapa! Yesterday has been and gone. It's over. You mean tomorrow.

LYAPA: Of course I mean tomorrow. That's exactly what I meant. We're playing football tomorrow. Thursday.



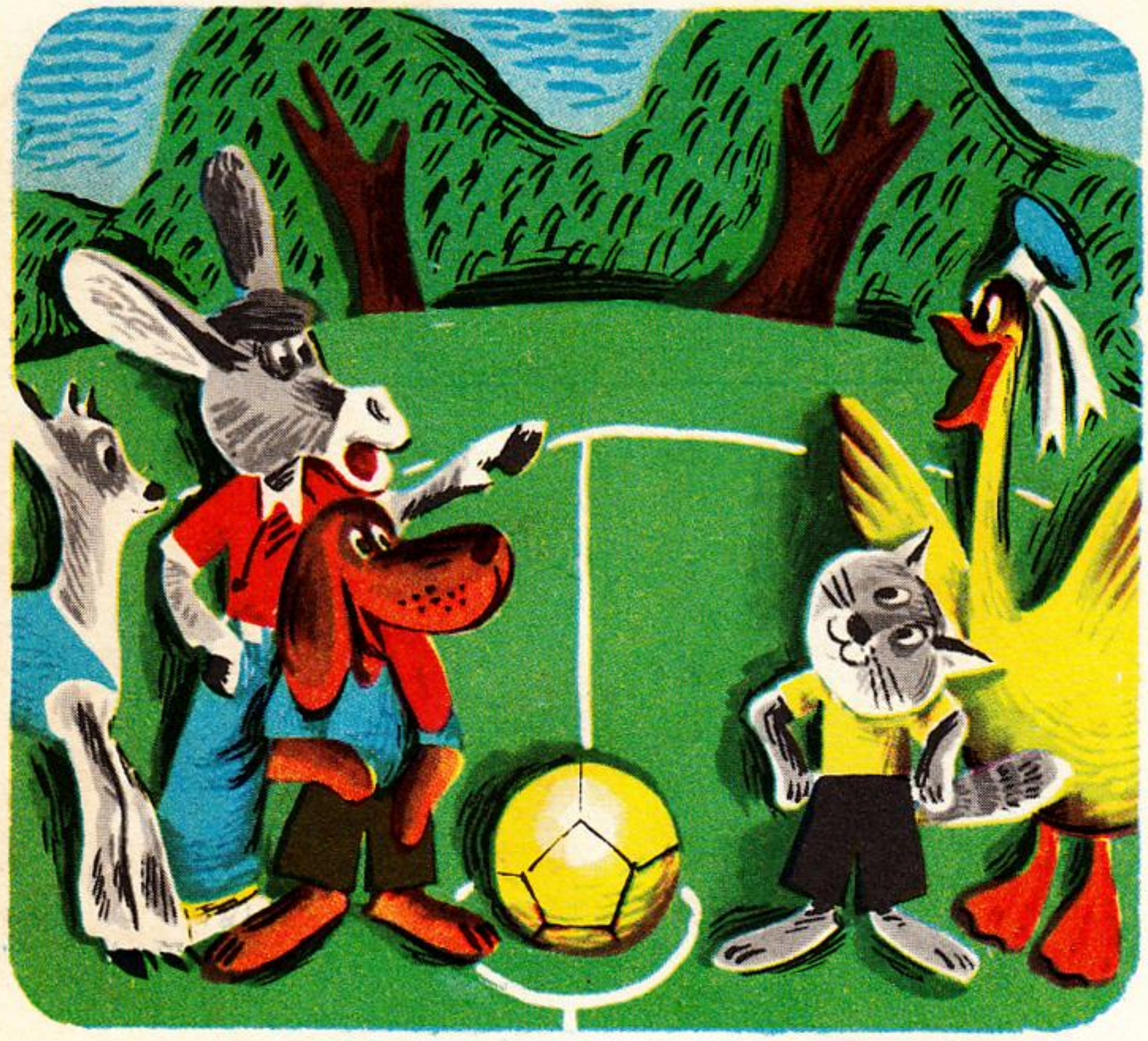
KITTEN: You're getting everything all mixed up again. Today is Saturday so tomorrow's Sunday. Yesterday was Friday and Thursday was the day before that. Clear?

LYAPA: Yes.



It's Sunday now. Let's start the game. Where are the posts?

KID: What a funny question! Don't you know that you need two teams for football? Each team tries to kick the ball into the other team's goal.



LYAPA: Of course I know. And now I'm going to divide us into two teams. In my team I'll have Kid and Puppy. The other team will be Duckling and Kitten.

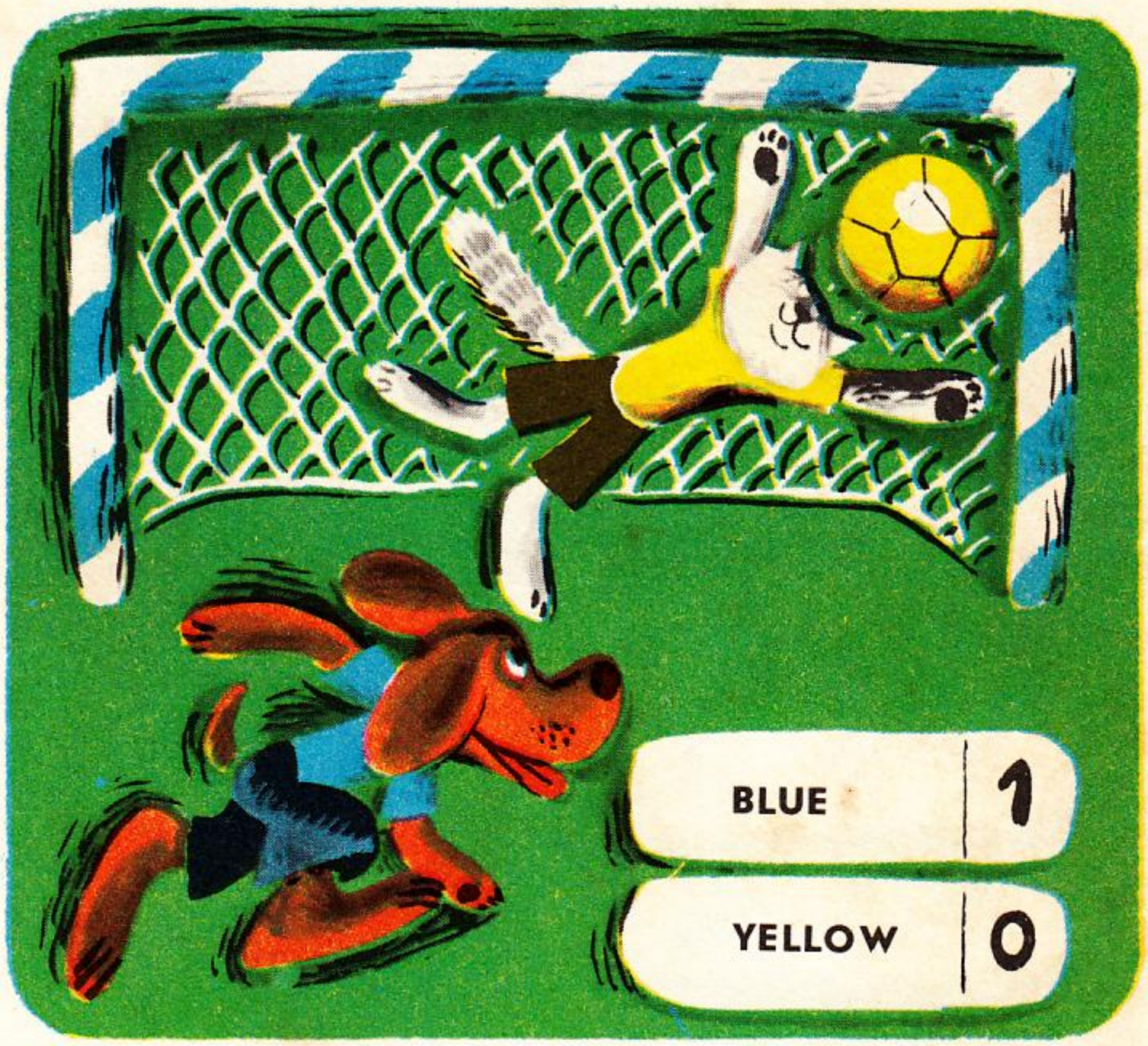
DUCKLING: That's not fair. There should be the same number of players on each team. You can't divide five players into two equal teams. We'll have to get some more.



LYAPA: That's what I was planning to do. Hare and Piggy! You come and play football with us. We'll divide you equally between the teams.

PUPPY: But Lyapa, now you've got four and three. That's still uneven. Someone from our team will have to be the referee.

LYAPA: I'll be the referee. GOAL!
One nil. The blue team is in the lead.

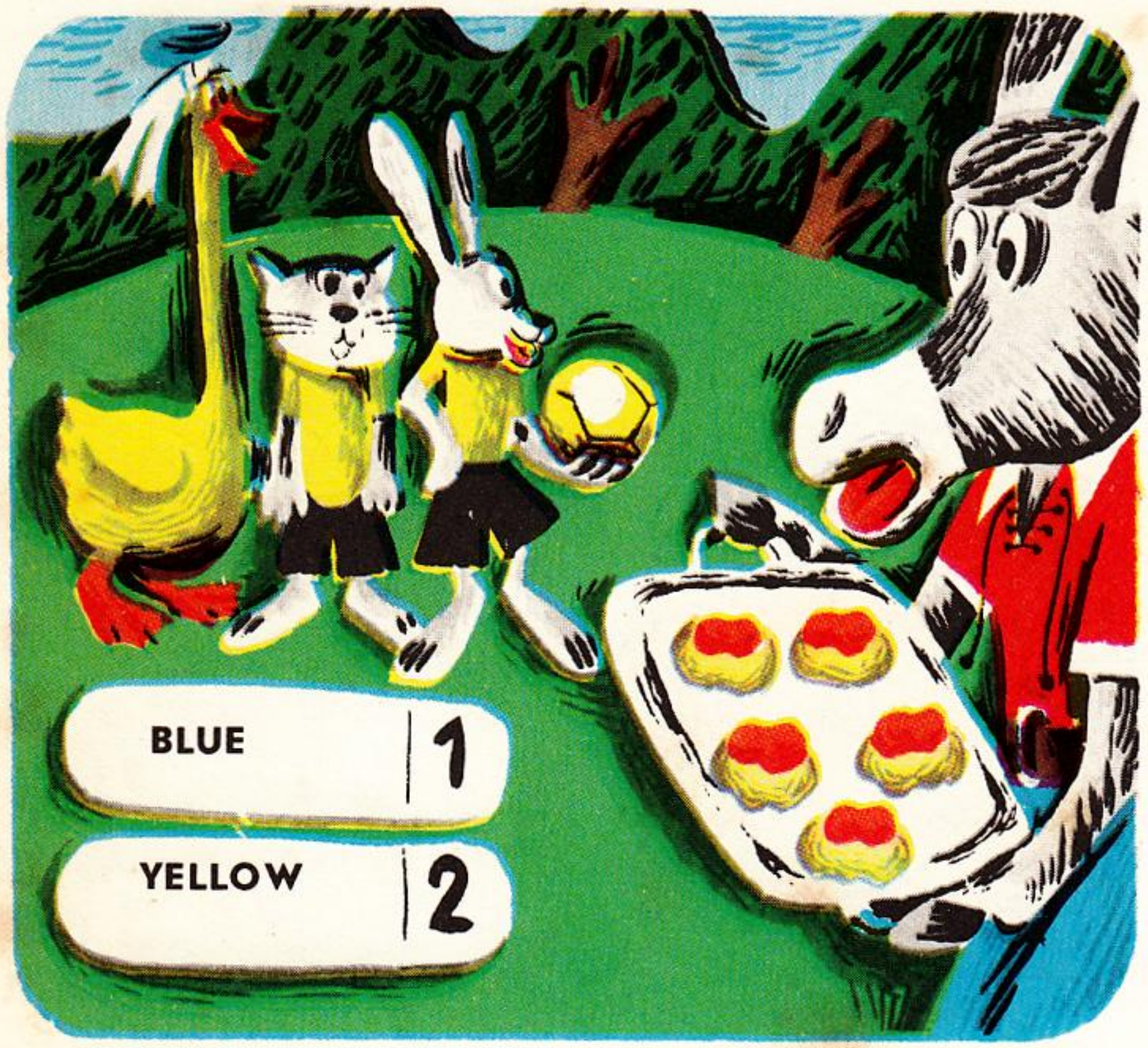


GOAL! Two nil.



DUCKLING: I say, referee! You can't count. It was the yellow team that scored just now. The score is one all.

LYAPA: That's what I meant. One all.



Another goal for the blue team! Two one. The yellow team wins. Here's the prize for the champions: two cakes each.

HARE: Then why have you only got five cakes! There are three of us.

LYAPA: But I've worked it out. There are three of you, and it's to be two cakes each. So you add two to three.



ALL: You're still completely muddled. You don't add. You multiply, that's what you have to do. And you can't do division either. Oh, Lyapa, you've got so much to learn.


The Eighth Notebook

„One, two, three, four, five, I'm coming!.." cried Petya. He put his head through the door and looked into the room. Olya was nowhere to be seen. The children's room looked quite different from usual. It seemed to have been specially prepared for a game of hide-and-seek. The furniture had been moved and there were books and toys all over the floor.

Cautiously Petya approached the armchair on tip-toe. He looked behind it. Olya wasn't there. He half-opened the door of the now empty wardrobe. She wasn't there either. Then he spotted the hem of a dress sticking out from behind a pile of books. He stole over and looked behind them. There was Olya, crouching with her hands over her face.

"There you are!" Petya cried.

Olya started and jumped up, accidentally knocking the pile of books. They all started falling onto Petya. He jumped aside and bumped into Daddy who was just coming into the room, with a big pile of books in his arms. They fell on Petya too.

Olya almost burst into tears and Petya didn't know what to do.

"What a mess we've made!" said Daddy laughing. The children laughed too.

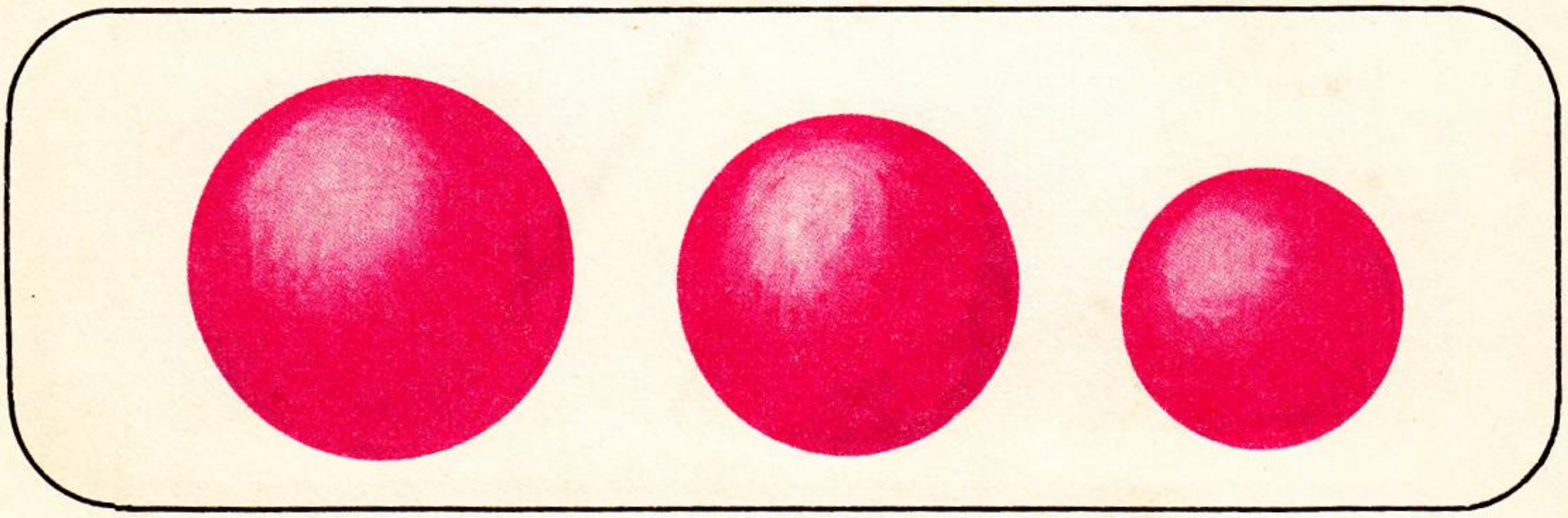
"Listen," Daddy went on. "Let's stop the hide-and-seek for a while. We've got a job to do before Mummy gets back. We have to arrange the books in the new book-case. Actually," he added, "maths will come in handy here."

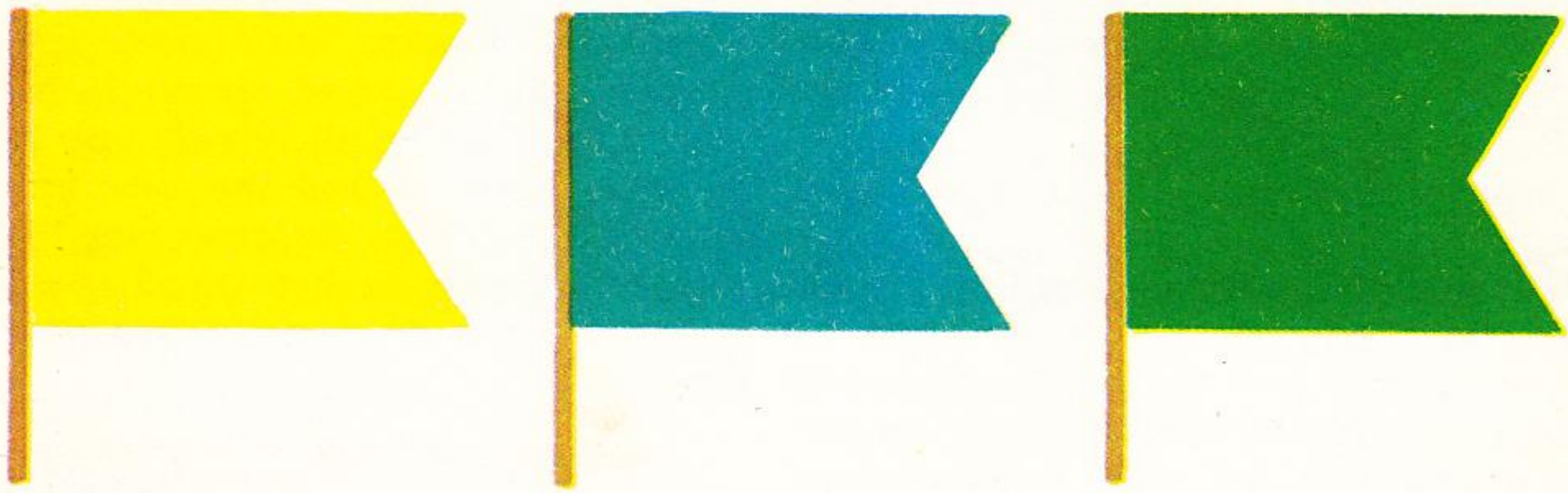
"Why maths!" asked Petya.

"There are lots of different uses for maths," Daddy said. "We're not going to pick the books up off the floor and stuff them into the book-case any old how. We'll have to arrange them so that it's easy to find the one you want. All the books on each shelf should have something in common."

"What sort of something!" Petya asked.

"Well, things differ from each other in many different ways," Daddy explained. "Size, colour, shape and so on. It's







often a good idea to use those differences to arrange things sensibly. In fact, we've done it already now and then in our maths."

Petya was surprised.

"Don't you remember?" Daddy reminded him. "You sorted things out according to their shape. Some were circles and some were quadrilaterals. And then, amongst the quadrilaterals, some were rectangles and some were squares."

Do you remember how Petya sorted out the different shapes!

Petya nodded.

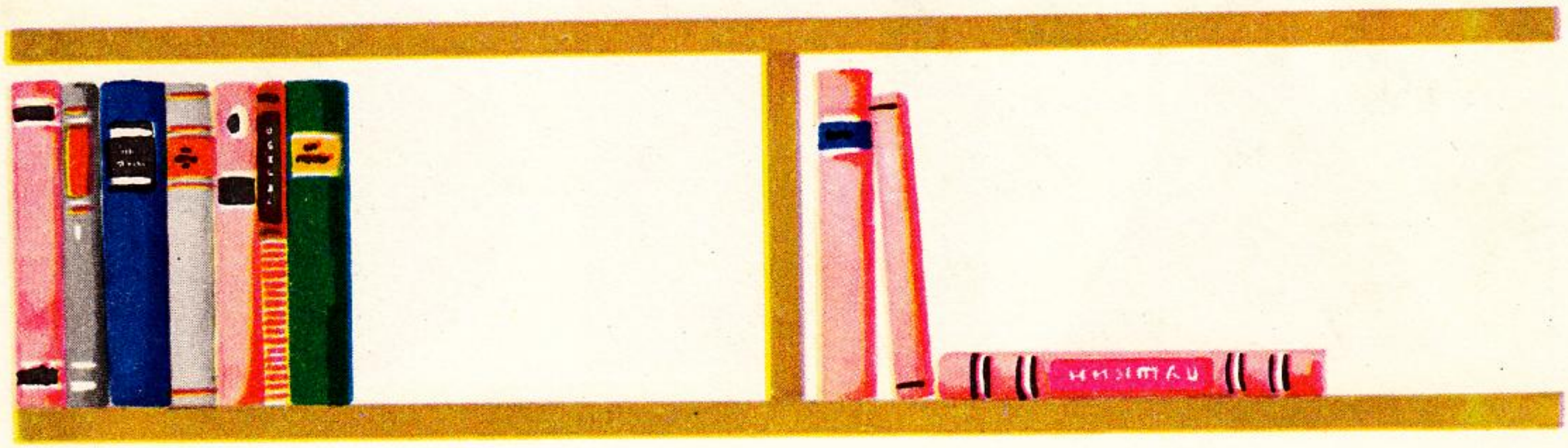
"Well, we have to do the same thing now," said Daddy. "From all these books, we have to choose the ones that have something in common and put them on the shelves accordingly."

"I want to choose books too," said Olya.

"Of course you may, darling," said Daddy. He went into the next room to get more books, and the children busied themselves trying to sort the ones on the floor. A few minutes later Daddy came back carrying another stack of books. By then Petya's shelf was already half full. The books had been arranged evenly according to size. On Olya's shelf there were only three books. They were all the same colour, red.

"I don't think this is the most useful way of arranging them," Daddy went on. "There are all sorts of books here, Petya. Children's books, fairy-tales, grown-up stories, books I need for work, dictionaries. And they're all mixed up. It could be very hard to find the one you want in such a muddle. So arranging them by size isn't really such a good idea. Think about it for a bit longer this time. Any ideas?"

What do you think?



"Not bad," said Daddy. "I see what each of you had in mind. But will it be easy to find the exact book you want when they're arranged like this?"

What do you think?

"Why don't we do it like this?" suggested Petya. "One shelf just for children's books, and another for your work. And another for grown-up stories. Then it'll be easy to find the books you want."

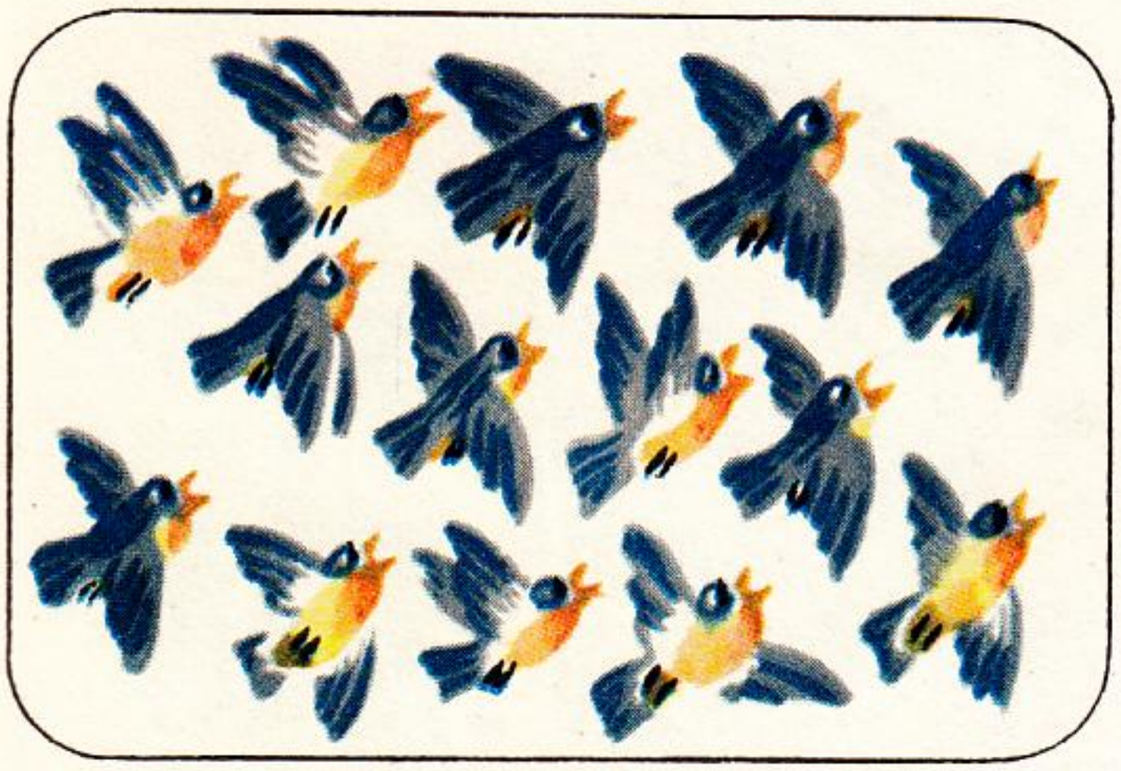
"Now you're talking," said Daddy. "So we can put some of the set of books on your shelf onto other shelves according to subject."

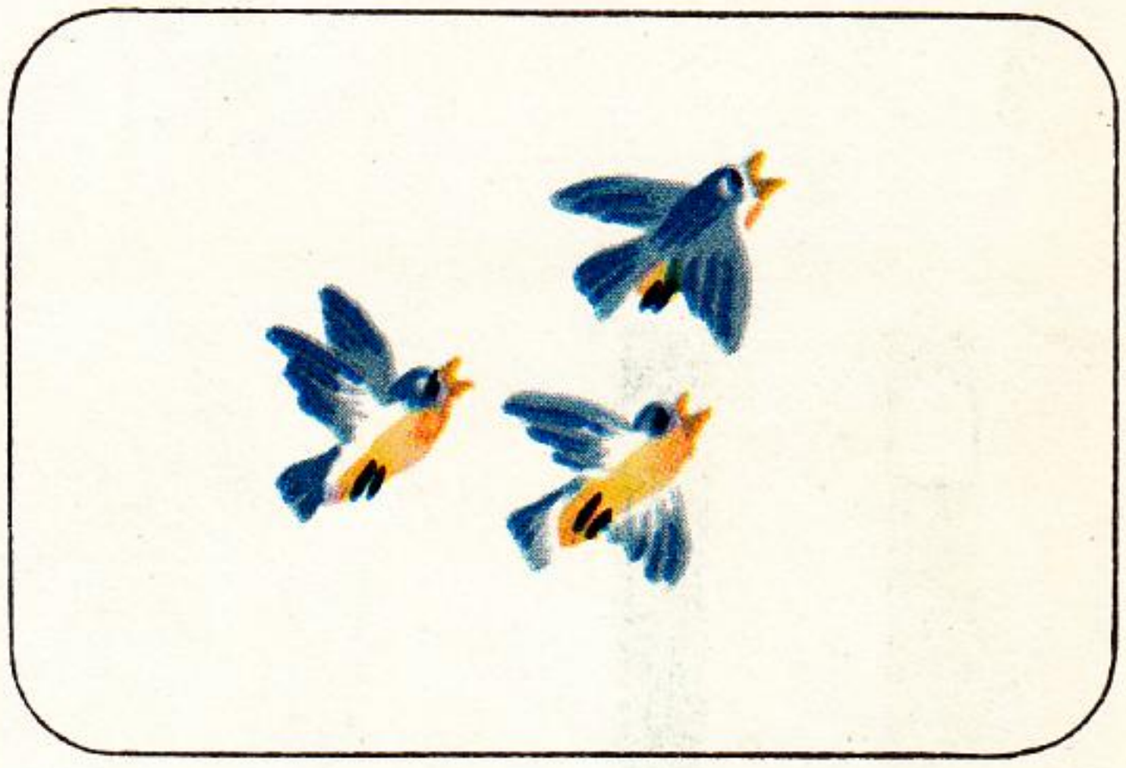
"And shall we also put some of the set of red books on other shelves?" Olya asked.

"What do you mean, set of red books?" Petya sneered. "That's not a set. You've only put three books on your shelf."

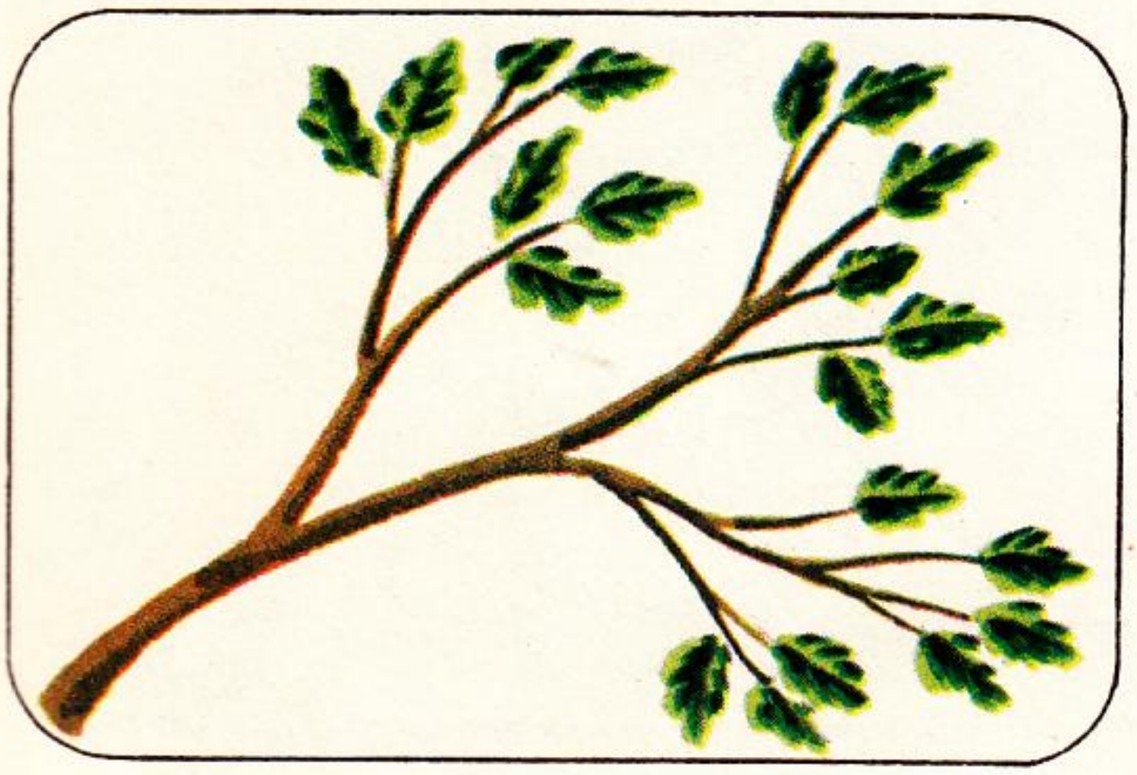
"So what? Mine's a set just as much as yours is."

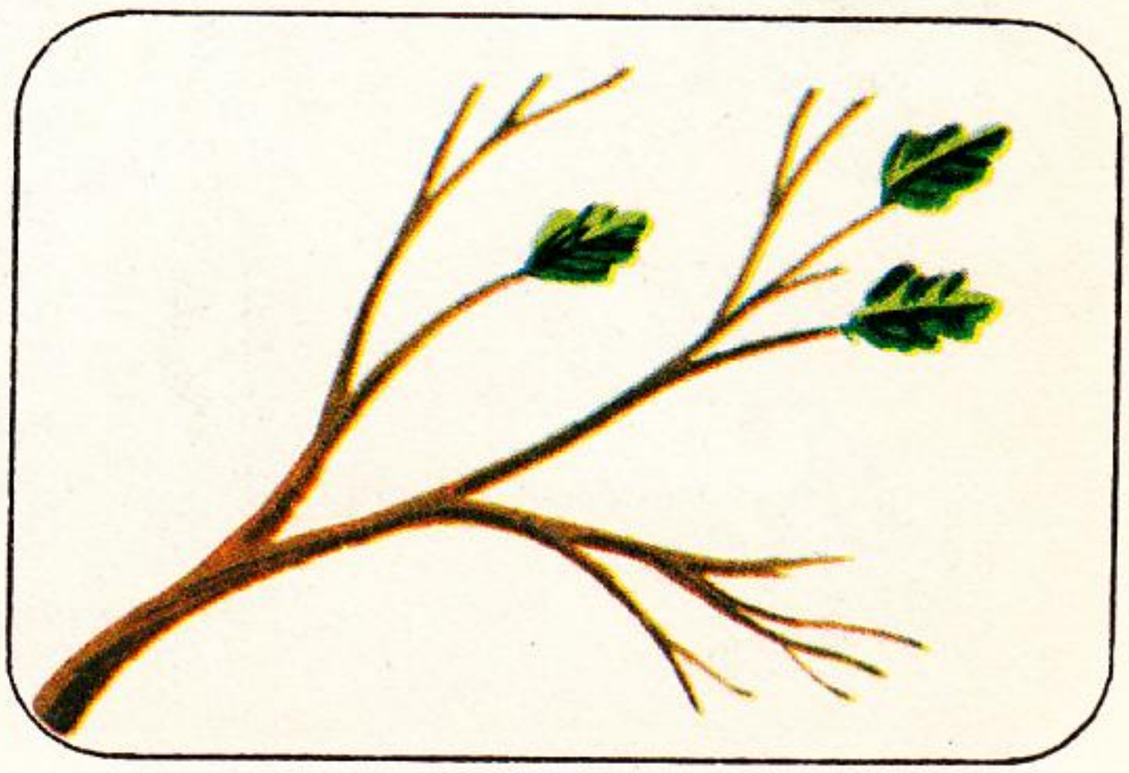
Daddy smiled. "Olya can certainly stand up for herself. And she's right, Petya. In maths a set doesn't always mean a lot. Whenever you arrange things according to what they have in common, they make up a set. It doesn't matter how many there are. I'll give you some examples. A set of knives and forks. A set of tools. A tea-set. Birds together in the sky are called a flock.





A set of leaves...





And musicians who play together are called..."

"An orchestra!" cried Petya.

"That's right," said Daddy. "A set of musicians is called an orchestra. Now you give some examples."

You give some examples of sets too.



"A set of toy soldiers," suggested Petya.

"A set of dolls," added Olya.

"Very good examples," Daddy agreed. "But let's get back to the books. The ones on Olya's shelf do make up a set ... a set of three."

Petya took a book off Olya's shelf. "Is that still a set?" he asked.





"Yes. A set of two."

Petya took off another book. "And now?"



"It's still a set. It's a set of one."

Petya took the last book off the shelf and looked at Daddy triumphantly.



"And is that a set?" he asked. The shelf was emply.

"Yes. Imagine that, it's still a set. It's called an empty set."

Petya laughed. "Some set. Empty..." He turned to Olya. "Guess what happened yesterday! I went out into the courtyard and saw a set of bears!"

"Stop pulling my leg, Petya. There've never been any bears in our yard," objected Olya. "Bears live in the zoo."

"I'm not pulling your leg. It was an empty set of bears. That means there weren't any bears. Daddy's just explained it."

"Well done," said Daddy. "You're a fibber, of course, but you've got the idea of the empty set."

Do you understand what an empty set is! Can you say there's a set of giraffes in your flat!

Daddy and the children got to work together and soon the books were neatly arranged in the book-case.

"Well, the books are in order," said Daddy, pleased. "We've done a good job with them. Now let's try to put your toys in order too, before Mummy gets back. OK?"

"OK," Petya and Olya answered together. Then Petya continued, "Shall we sort the toys out according to something they've got in common?"

"Of course. There's a place for everything. A place for the building-blocks, a place for Olya's dolls, a place for the cars and lorries..."

When the toys had all been put away Daddy suggested that they put the final touches to the room. There wasn't much to do. They put the clothes away in the wardrobe, spread the rug out on the floor and arranged the chairs.

"Our room looks nice again," said Olya.

"I should think Mummy'll be very pleased with us," Daddy agreed.

"Can we do some more maths before she comes back?" asked Petya. "I liked arranging different sorts of sets. Let's do some more."

"Good idea," said Daddy. "Sets are very important. Why don't we take a set — any set you like — and divide it into parts according to the things the different objects in it have in common. You see, any part of a set is also a set."

"What set shall we do it with?" Petya asked.

"Choosing a set is easy. Your car collection is a set. Why don't you go and get it. How many cars have you got, by the way? Can you count them?"

Petya counted. He had eight.

"Well, the set can be divided into parts. There are lots of different ways we can divide it. For instance, you can ask yourself if the car is meant for carrying goods or people."

"Yes," Petya agreed happily. "That makes two parts, cars and lorries."

"Right. So in this case you can divide your set into two parts. How many objects are there in each?"

"There are three cars in the car set and five lorries in the lorry set," said Petya.

Is he right?

Daddy nodded. "Another possibility," he went on, "is to divide them according to colour. Can you tell us what colours Petya's cars and lorries are, Olya?"

Olya looked at them carefully. "Red," she said. "Another red, and yellow and ... blue."

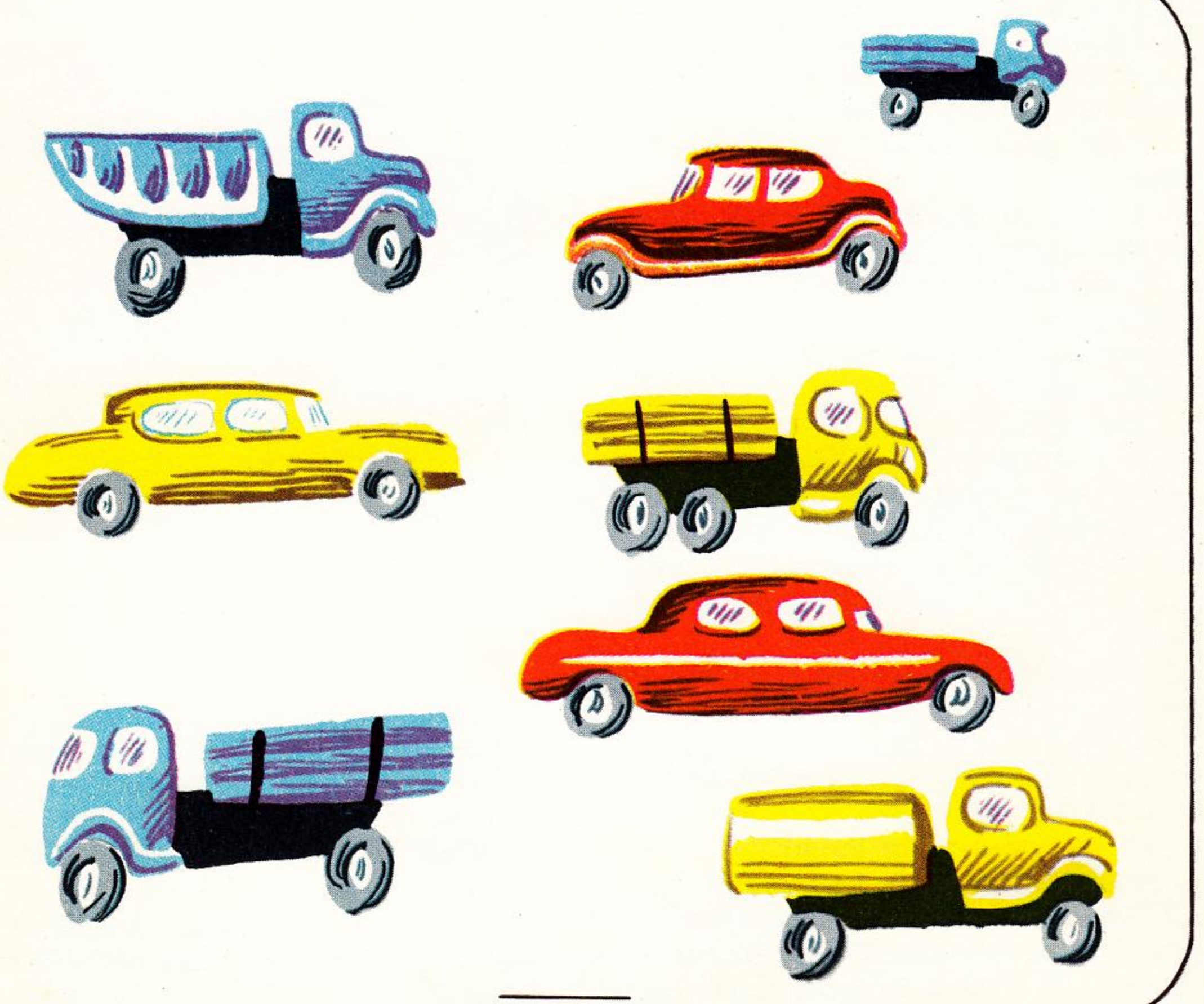
"Good girl," said Daddy. "And so, Petya, how many parts has our set got now?"

"Three," said Petya quickly. "Red, yellow and blue."

"Two red, three yellow and three blue," Petya went on.

"That's right," nodded Daddy. "Now we'll make it a bit more difficult. We'll divide the set into parts depending both on the colour and the use. We can start with the red cars. Put them on one side. And now the red lorries."

How many cars and lorries of each colour are there?



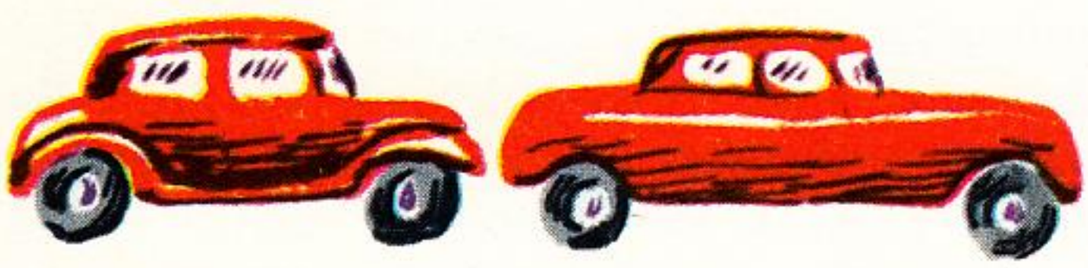
"But there aren't any red lorries!"

"No, there aren't. But it's still a set, remember! An empty set. So that's an empty set of lorries. Now, yellow cars. Go on, you do it now."

Petya started excitedly picking out cars and lorries of different colour and putting them on one side. Olya helped him. Here is how they arranged them.

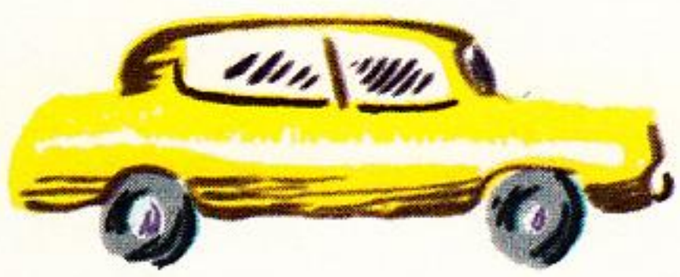
Make a list of all the sets of cars and lorries according to colour and use, and say which picture goes with each.

red cars

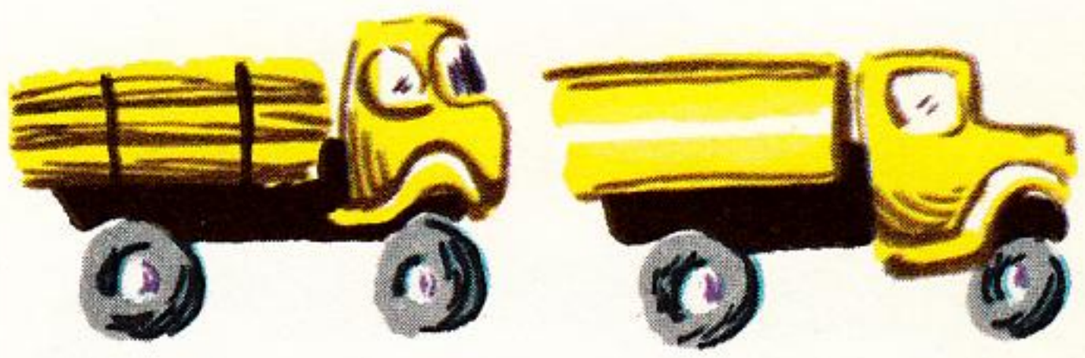


red lorries

yellow cars

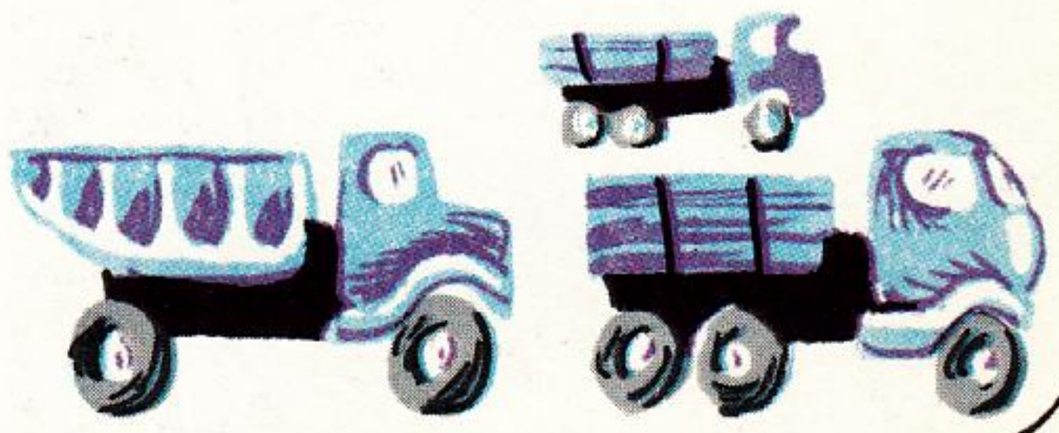


yellow lorries



blue cars

blue lorries



"Good," said Daddy. "So how many parts does that give us for the set?"

You answer Daddy's question too.

"Four," said Petya. He pointed to the four groups of cars and lorries.

Daddy shook his head. "Nearly," he said, "but not quite. You haven't counted the emply sets, so you've left some out. The set has six parts: red cars, red lorries; yellow cars, yellow lorries; blue cars, blue lorries. Six. It's true that two are empty. You haven't got any red lorries and you haven't got any blue cars."

"But why do you have to count the parts that are empty sets?"

"That's a very interesting question," Daddy smiled. "If you know before you start that a particular set is empty, you don't have to bother with it. But otherwise you can't be sure whether or not any of the parts are empty sets. Think about it for a moment. Let's imagine a group of athletes at a school sports ground. You can divide the group into three parts, a set of children playing football, a set of children playing volleyball and a set of children playing basket-ball. Now it could well be that the basket-ball court is empty today. But that doesn't mean there was no point building it. There might have been some children playing there yesterday or perhaps they'll be playing there tomor-





row. And another example is..."

"I've thought of one," Petya interrupted. "Mummy's going to bring home lots of scrumptious things from the market. And I've divided them into two parts alpeady, fruit and vegetables."

"She said she was going to buy berries too," Olya threw in.

"Good," said Daddy. "You've told me what the parts are. Why don't we get the right containers ready for them! We'll need a fruit-bowl for the fruit, a basket for the vegetables and a plate for the berries." He had hardly done speaking when Mummy came in and they all rushed to meet her in the hall. Daddy took the shopping bag from her.

"Let's go into the kitchen quickly!" shouted Petya. "And I'll tell you something interesting. Bags I have the fruit!"

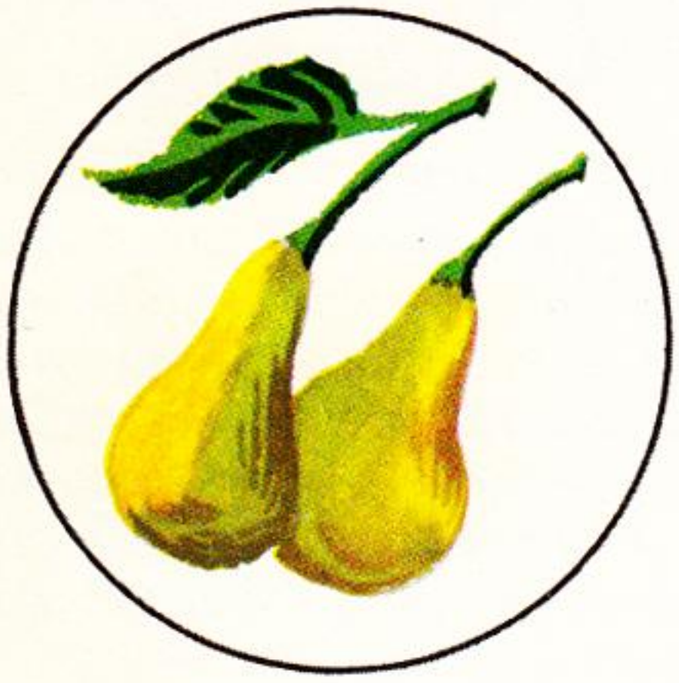
"And me the berries!" cried Olya.

"No, no," said Mummy. "Each of you will have something from every set. We can divide the sets into parts as well, you know, because we've got three kinds of vegetables — cucumbers, tomatoes and radishes. And we've got more than one kind of fruit as well. Tell us what they are, Petya."

"Pears, peaches and grapes. That's three kinds of fruit."



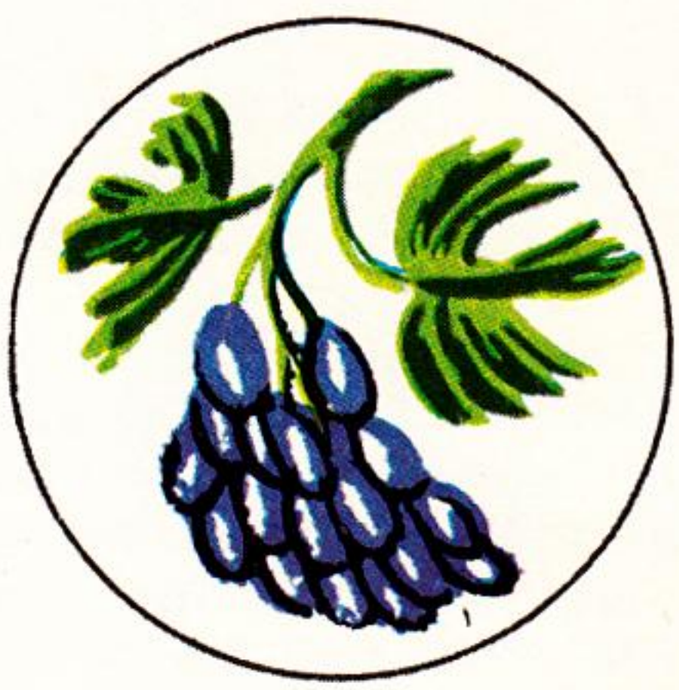
Fruit:



pears,

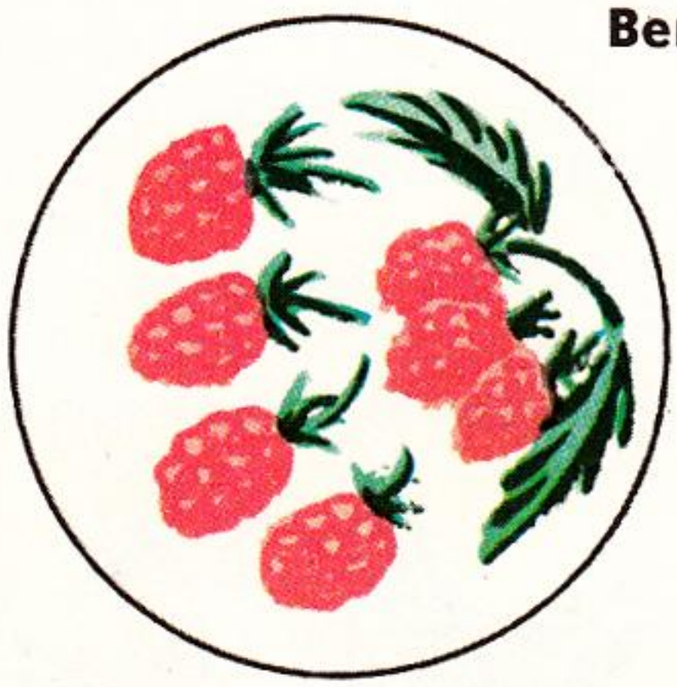


peaches,

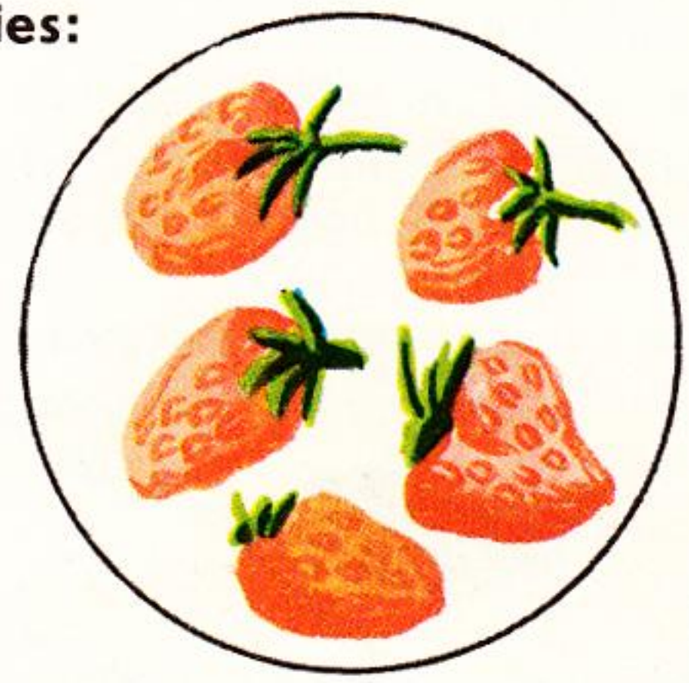


grapes.

Berries:



raspberries,

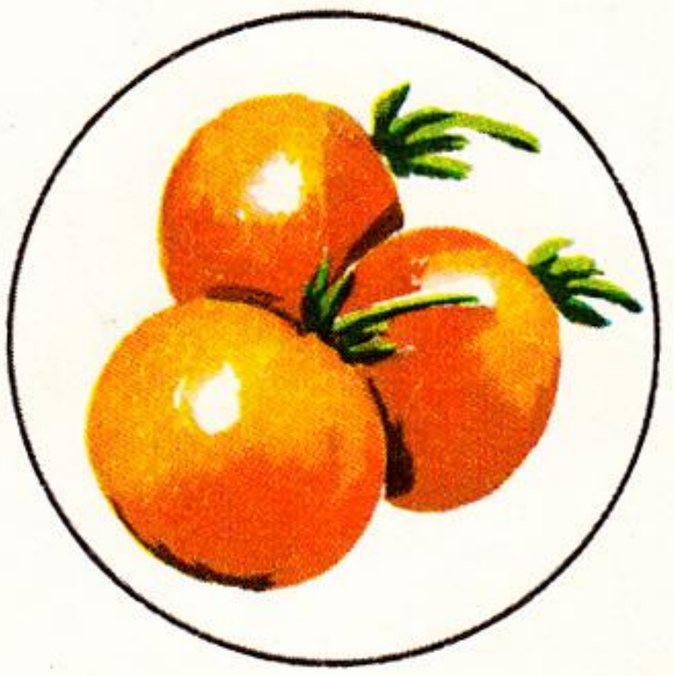


strawberries.

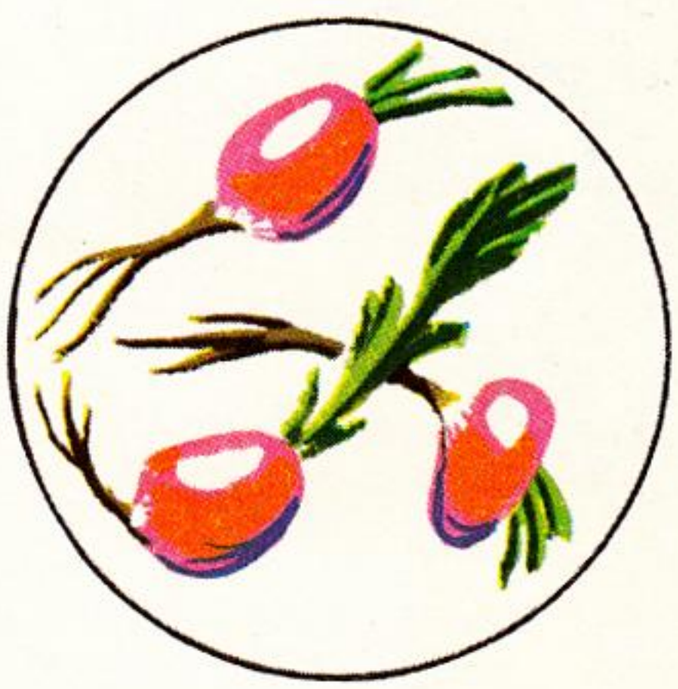
Vegetables:



cucumbers,



tomatoes,



radishes.

"That's right. And what about the berries! How many kinds of those have we got! You try, Daddy," Mummy added with a laugh.

Sounding serious, Daddy said, "Two kinds, raspberries and strawberries."

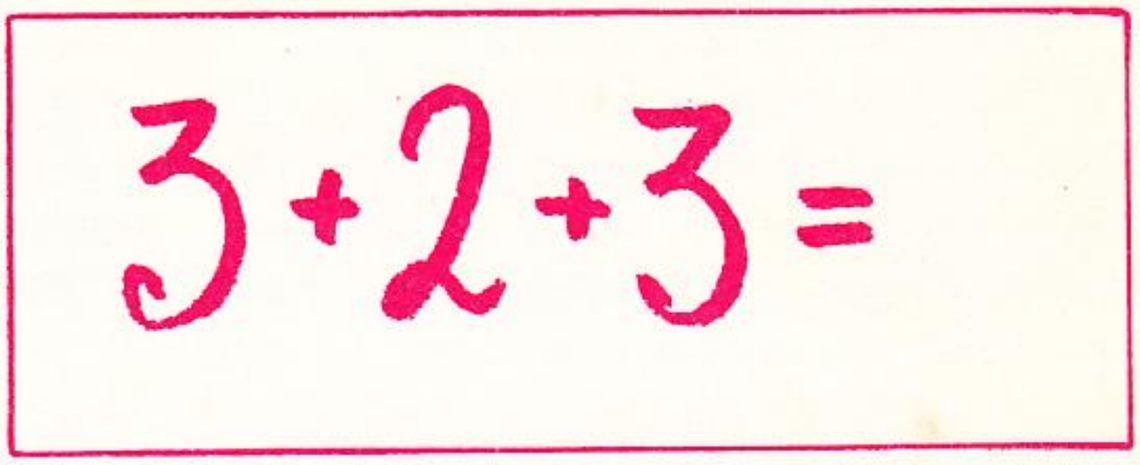
"You count up to two very well." Mummy said. "But can you tell me how many sets there are altogether!"

Can you say how many sets
of fruit, berries
and vegetables
there are altogether!
What other sorts of fruit,
berries and vegetables
do you know!

Daddy smiled. "No, it's too difficult for me, I'm afraid. Petya's the only one in our family who's up to it. He's the mathematician-in-chief."

Petya knew he was joking but he was pleased to be called a mathematician all the same. And he wasn't satisfied with simply answering the question as best he could. He wanted to write it all down as well. So he got out his notebook and started to work it out.

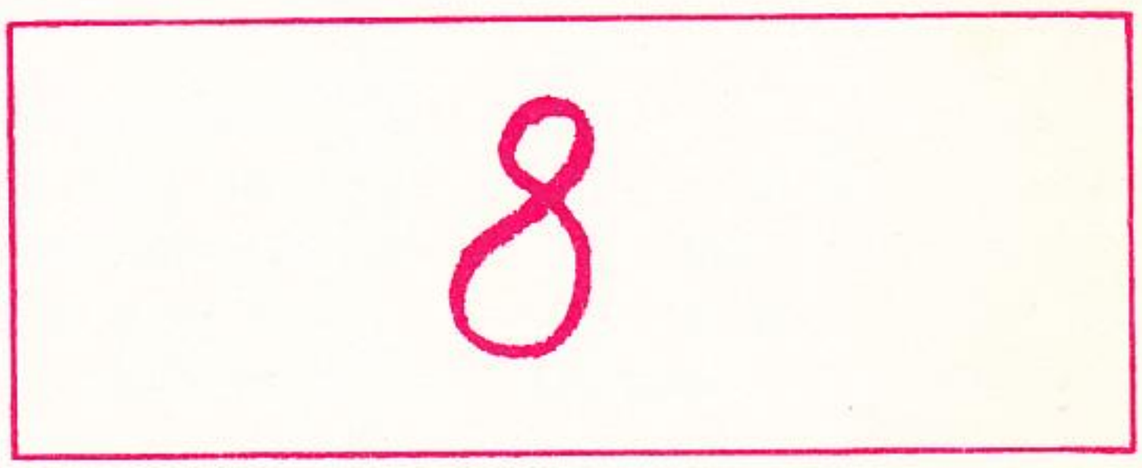
"We've got three sets for fruit, two for berries and three for vegetables. So the number of sets that makes altogether is



Let's write it. Three plus two plus three is eight."

"That's right," said Mummy. "Has Daddy shown you how to write an eight!"

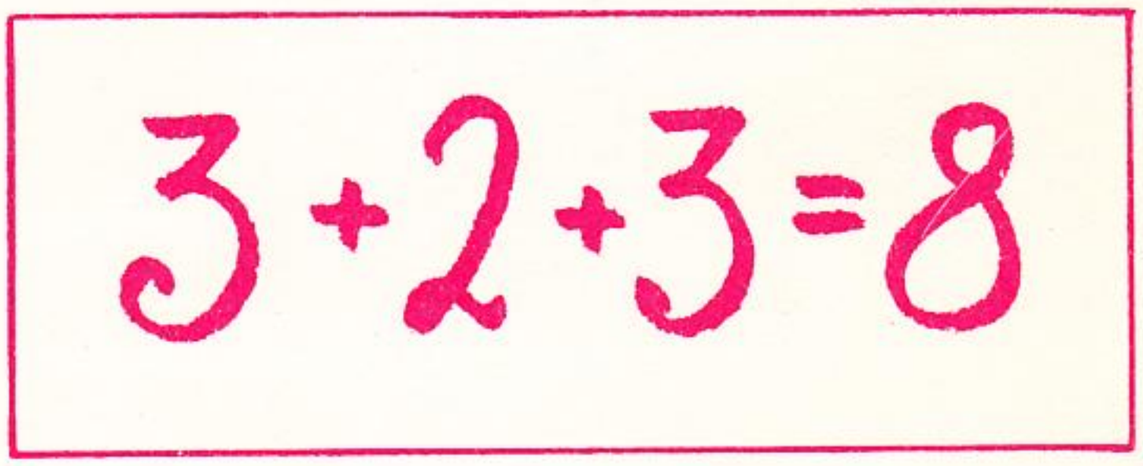
"Not yet," said Daddy. "Here we are.



Now write it in your notebook."

You write eight
in your notebook too.

So Petya wrote lots of eights in his notebook and then wrote in the answer to the sum about sets of fruit, berries and vegetables.



"I'd like to do another one," he said.

"All right," said Mummy. "Try this. We're going to have dinner. There are four of us and we'll have two plates each. How many plates will have to be washed up when the meal is over?"

2×4=8

You answer Mummy's question too.

"That's right," agreed Mummy. "Now you and Olya can help me lay the table. After dinner we're all going to the zoo."

Petya started to work it out. "We have two plates each. How many of us are there? Four. You have to multiply two by four. That makes eight. I'll write it in my notebook now. Eight plates to be washed up in all."



EXERCICES EXERCICES

1. What are these numbers!

7 8

2. What does this sign mean! ÷

3. Give the answers:

6+1=	7−2=
3+5=	8−8=
4+3=	8−5=
2+6=	7−5=

4. Give the answers:

1+2+4=	3+0+4=
1+6+1=	5+2+1=

5. Give the answers:

7×1=	7÷1=
1×8=	8÷8=
4×2=	8÷2=
2×4=	8÷4=

EXERCISES EXERCISES

6. An airmail envelope costs 7 pence. Seva has penny, tuppenny and three-penny coins. Name all the combinations he can use his coins in to make up 7 pence.

7. At seven o'clock there's a cartoon on television. It is now five o'clock. How long is there to go till the programme begins?

8. Vitya lives in Flat 6, in a four-story house. There are 2 flats on every landing. What floor does Vitya live on? Take your building blocks and build a block of flats using each building block as a flat. Show Vitya's flat.

9. Kolya and Andryusha were picking mushrooms. Kolya found 5 and Andryusha found 3. The boys decided to divide the mushrooms equally between them. How many did they get each? Write down the sum and the answer.



EXERCISES EXERCISES

10. Find the unknown number.

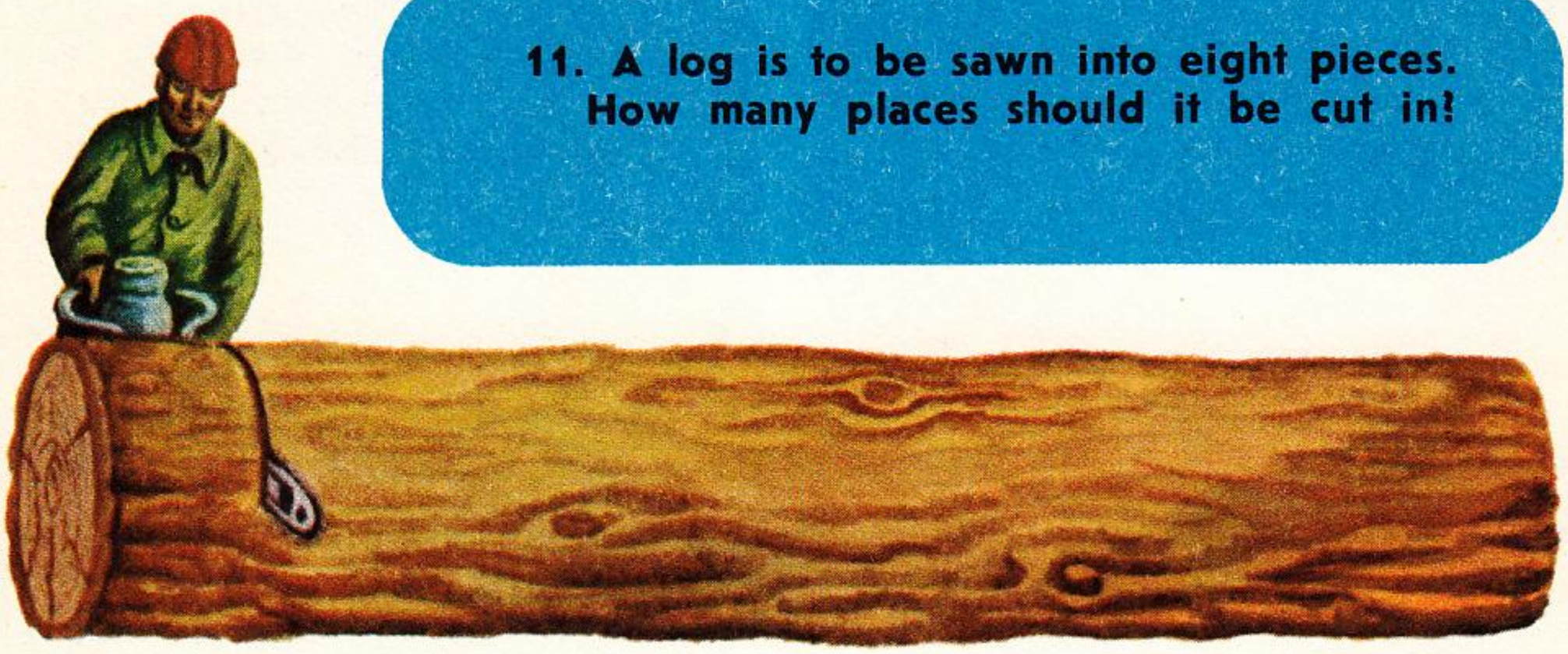
$\square + 4 = 7$ $\square \times 7 = 7$

$2 + \square = 8$ $4 \times \square = 8$

$\square - 5 = 3$ $8 \div \square = 2$

$8 - \square = 1$ $\square \div 3 = 2$

11. A log is to be sawn into eight pieces. How many places should it be cut in!

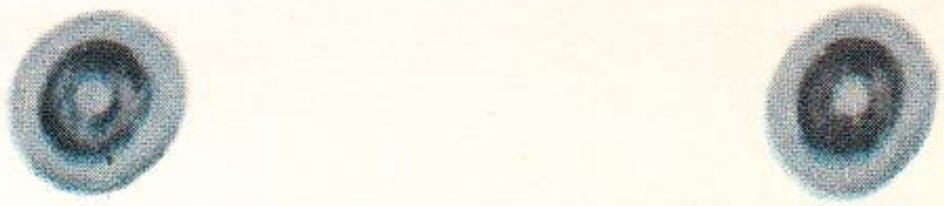


EXERCISES EXERCISES

12. Suppose today is Friday. What day is tomorrow? What day was it yesterday? The day before yesterday? Now answer the same questions supposing today is Tuesday.



13. Tolya's father had to go to Moscow on business. "When are you coming back?" Tolya asked him. "You can work that out for yourself," his father replied. "I'm leaving on Saturday. I'm going and coming back by train. It's a day's journey each way. I'm going to spend three days in Moscow. What day of the week shall I get back on?" You answer the question too.



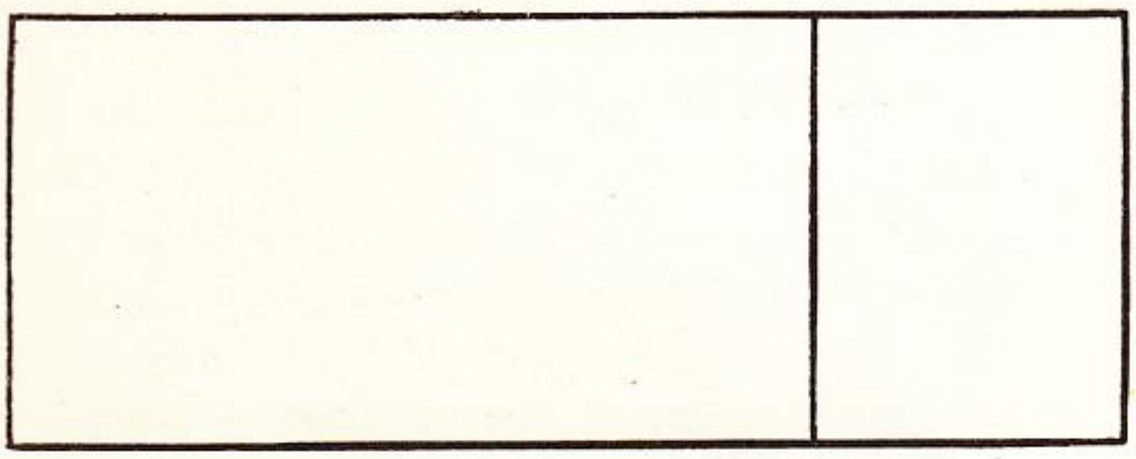
14. Ira lives on the third floor. It takes her half a minute to go down one flight of steps. How long does it take her to reach the ground floor?

15. Sveta is three. Natasha is two years older. Katya is twice Sveta's age. How old are Natasha and Sveta?

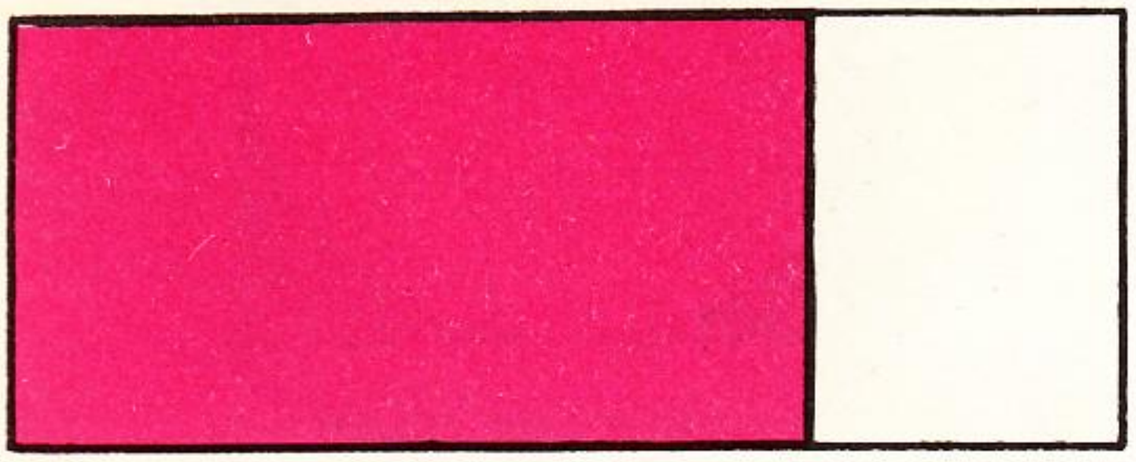
16. In the Zoo, the cages for squirrels, hares and hedgehogs are next to each other. There are eight squirrels. There are two fewer hares than squirrels. There are only half as many hedgehogs as there are squirrels. How many hares and hedgehogs are there?

EXERCISES EXERCISES

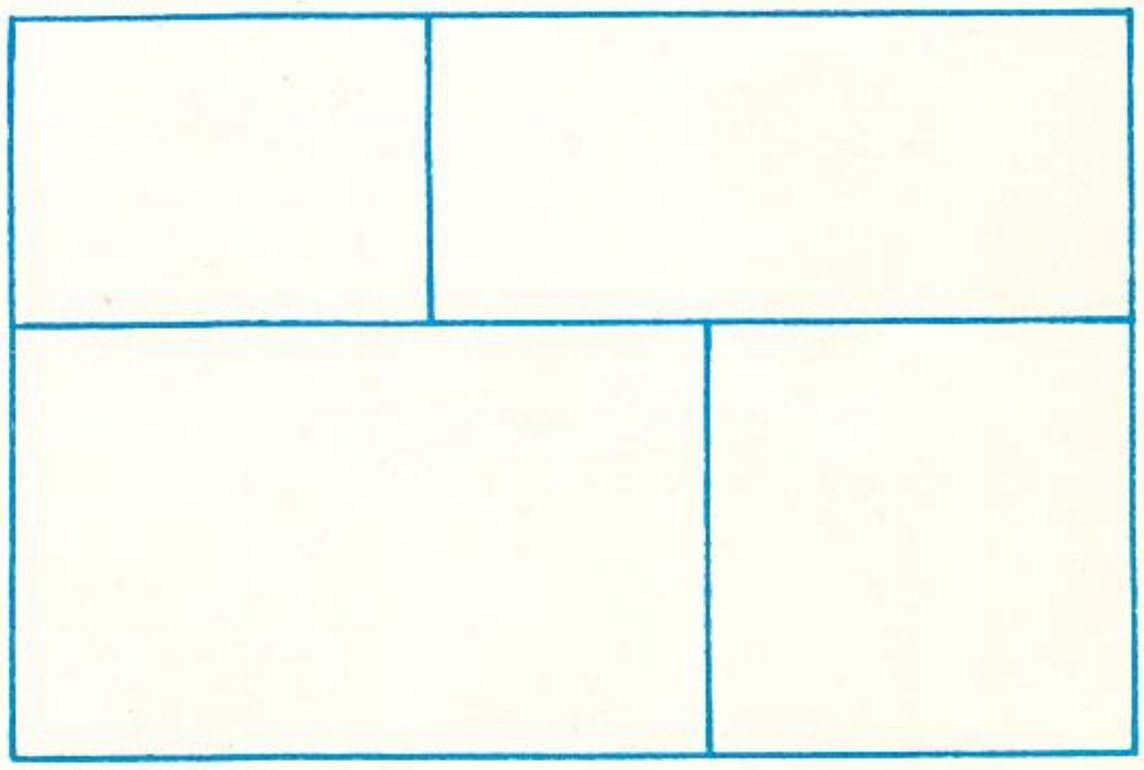
17. Here are three rectangles.



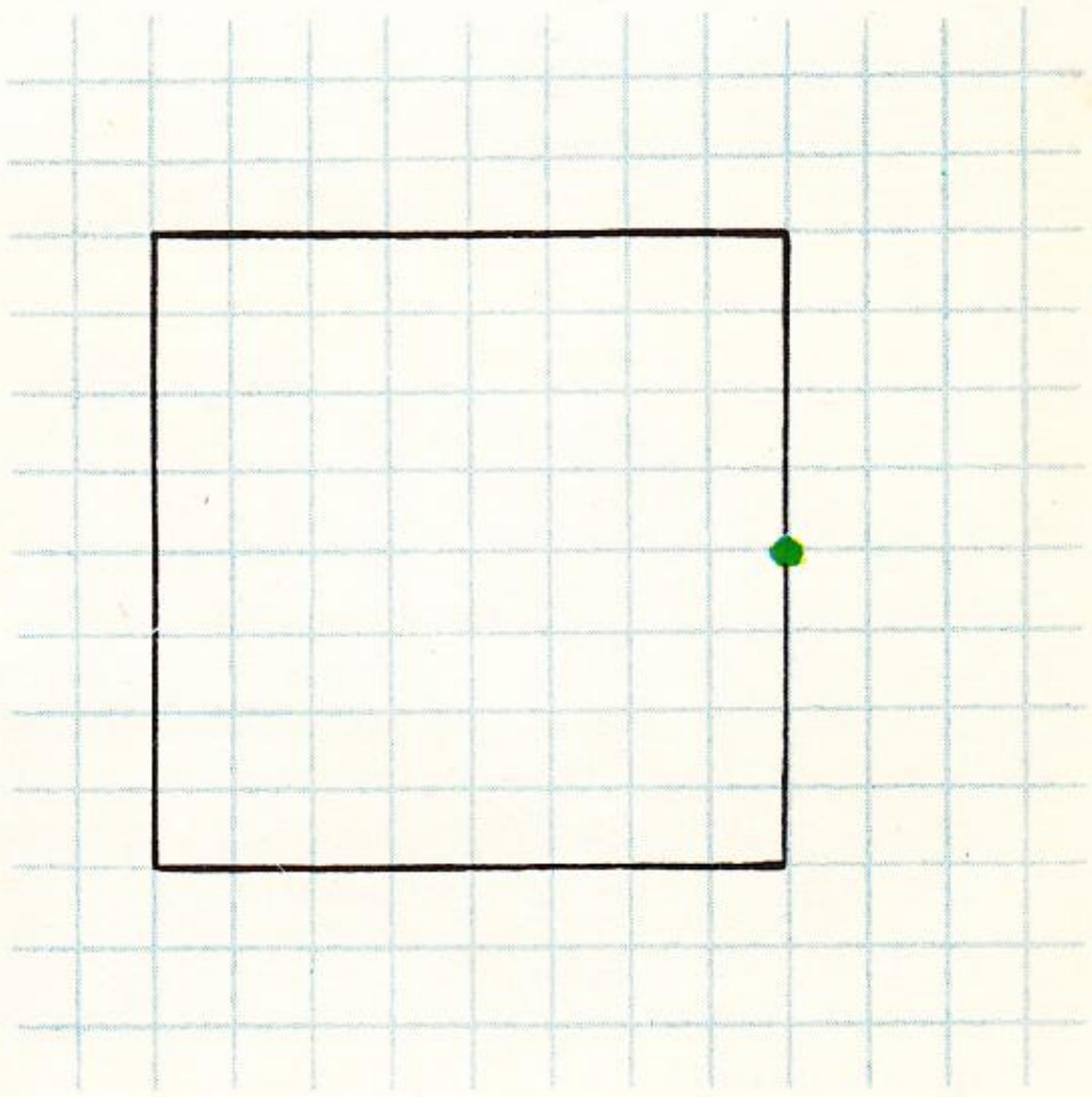
Now they have been coloured in.



There are now seven rectangles. Show them all.

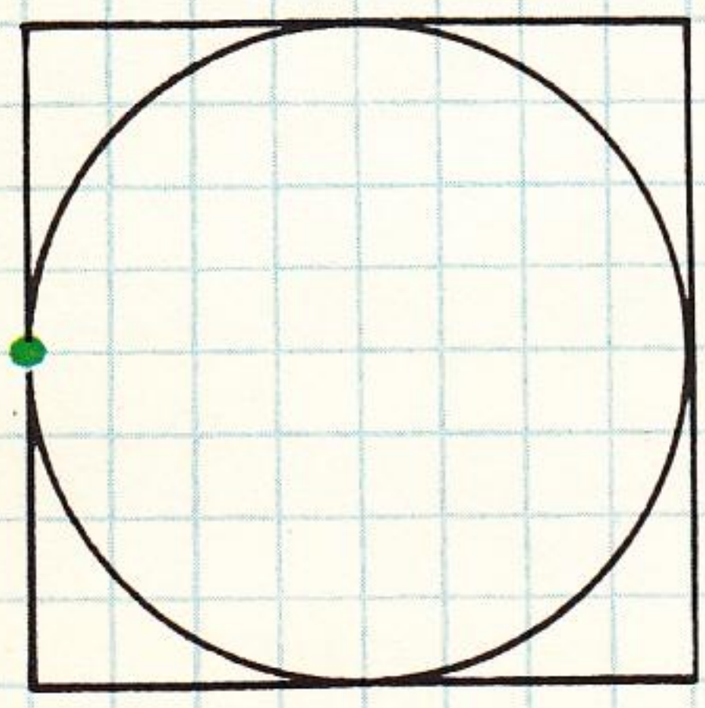


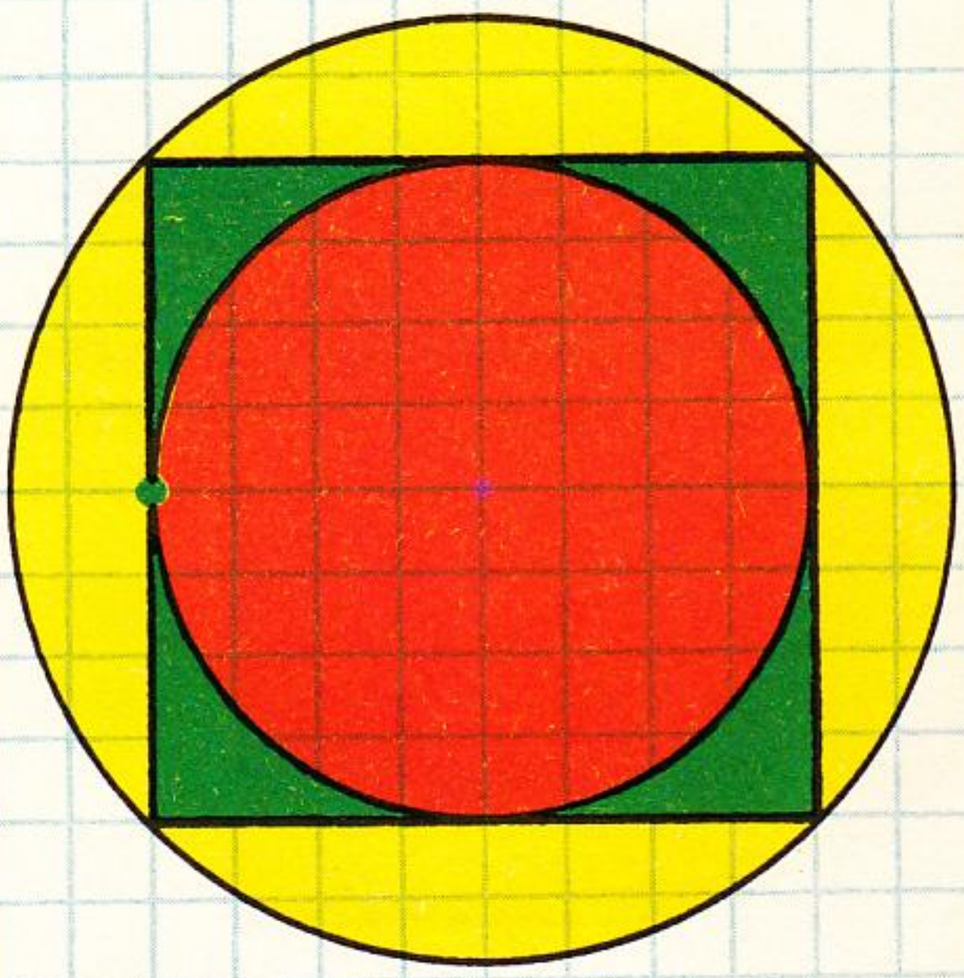
18. Draw a square on squared paper and make red and green dots on it as in the picture.



EXERCISES EXERCISES

Then put the compasses' needle in the red dot and the pencil lead on the green one. Draw a circle. You can see that the circle touches all the square sides. Now place the needle of the compass in the red dot again and the pencil lead on a corner of the square. Colour in the new shapes.



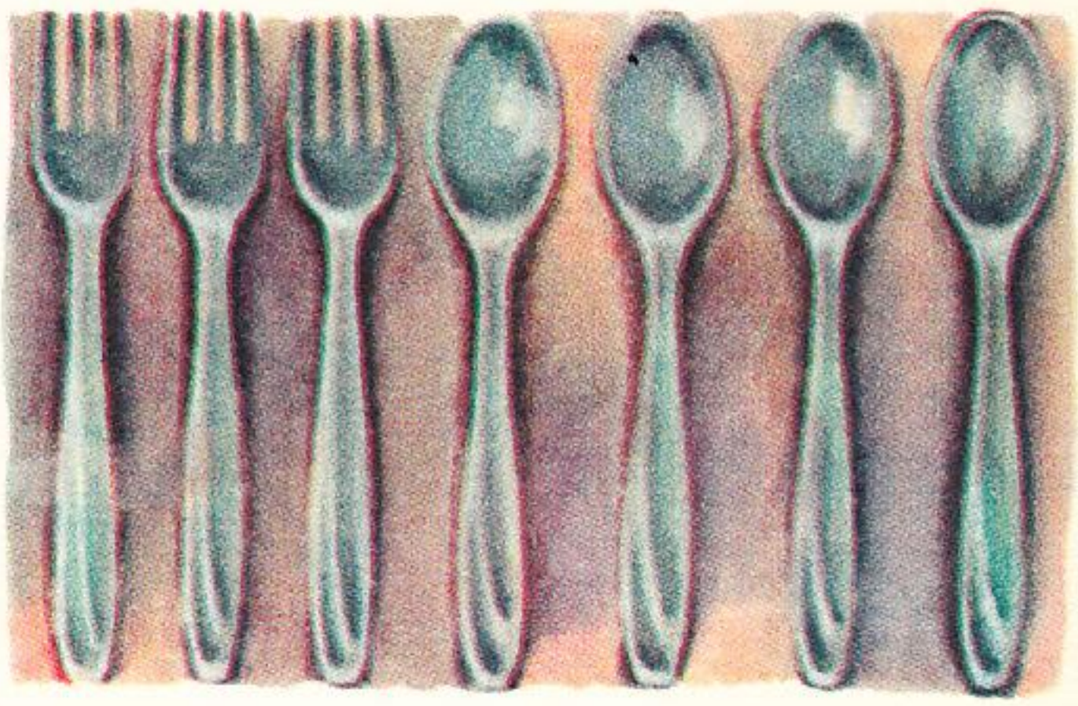


19. Look closely at this set of shapes. Point to a set of circles. How many shapes are there in this set? Now point to a set of triangles. How many shapes are there in it? What other set of shapes can you find here? How many shapes are there in this set? Now divide the sets up according to colour. How many shapes are there in each set?

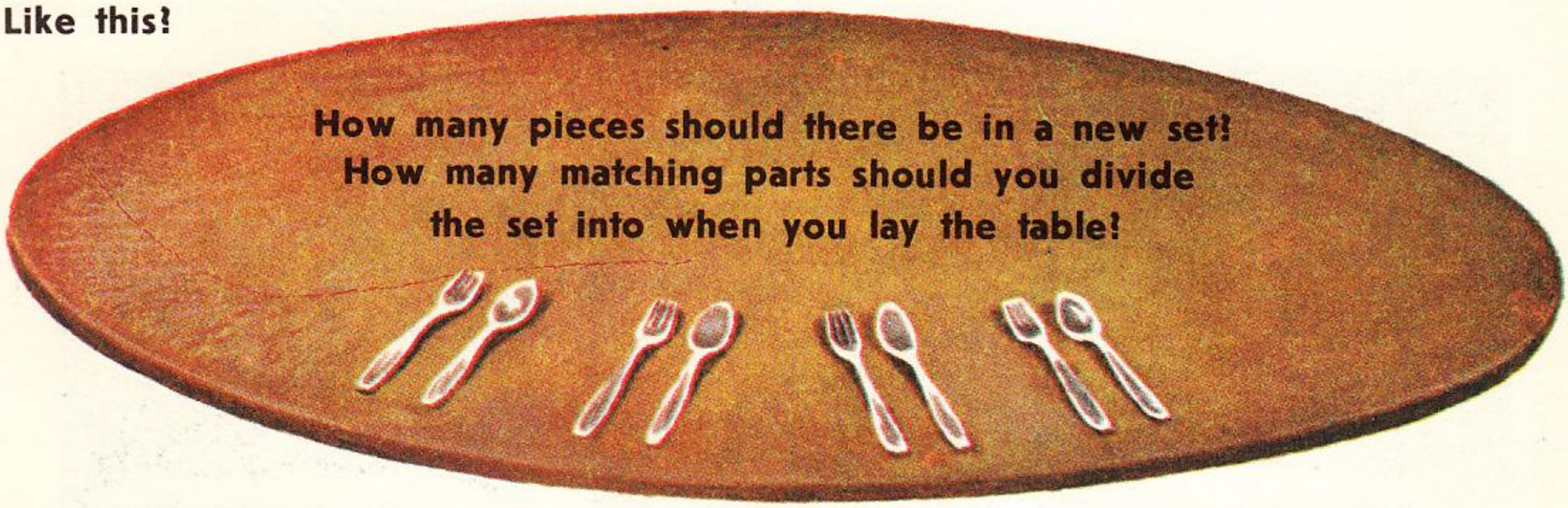


EXERCISES EXERCISES

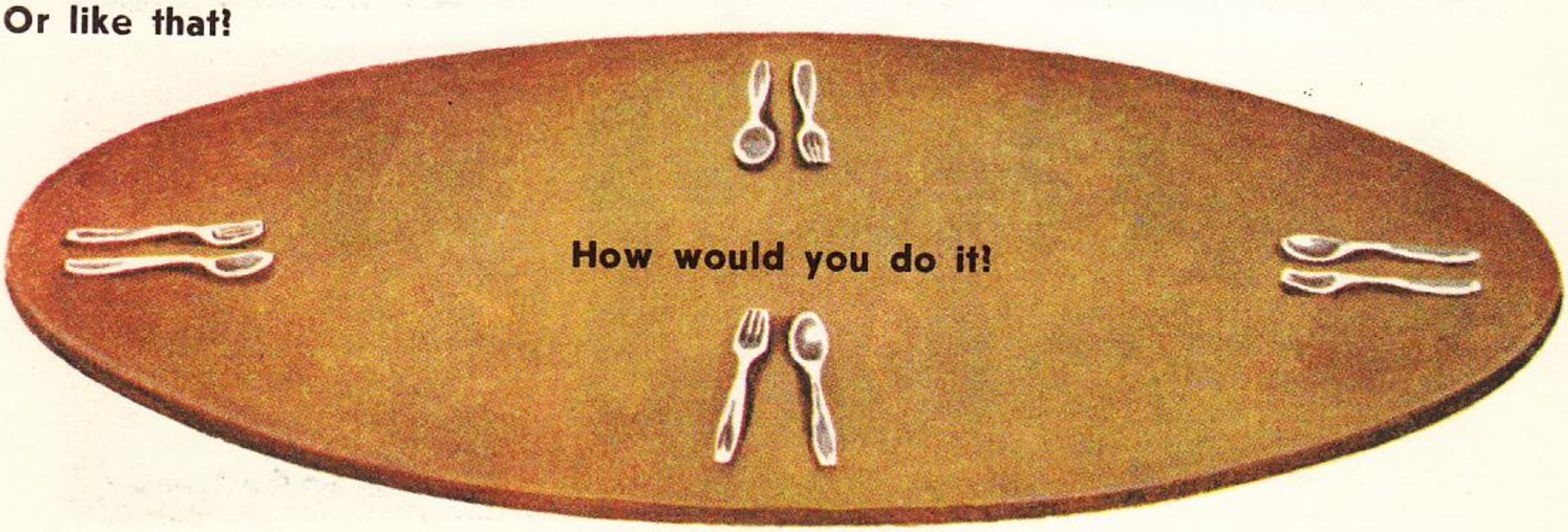
20. Look closely at this set of cutlery. How many parts can it be divided into? Four people are going to have dinner. Is there enough cutlery? Do we need any extra pieces?



Like this?



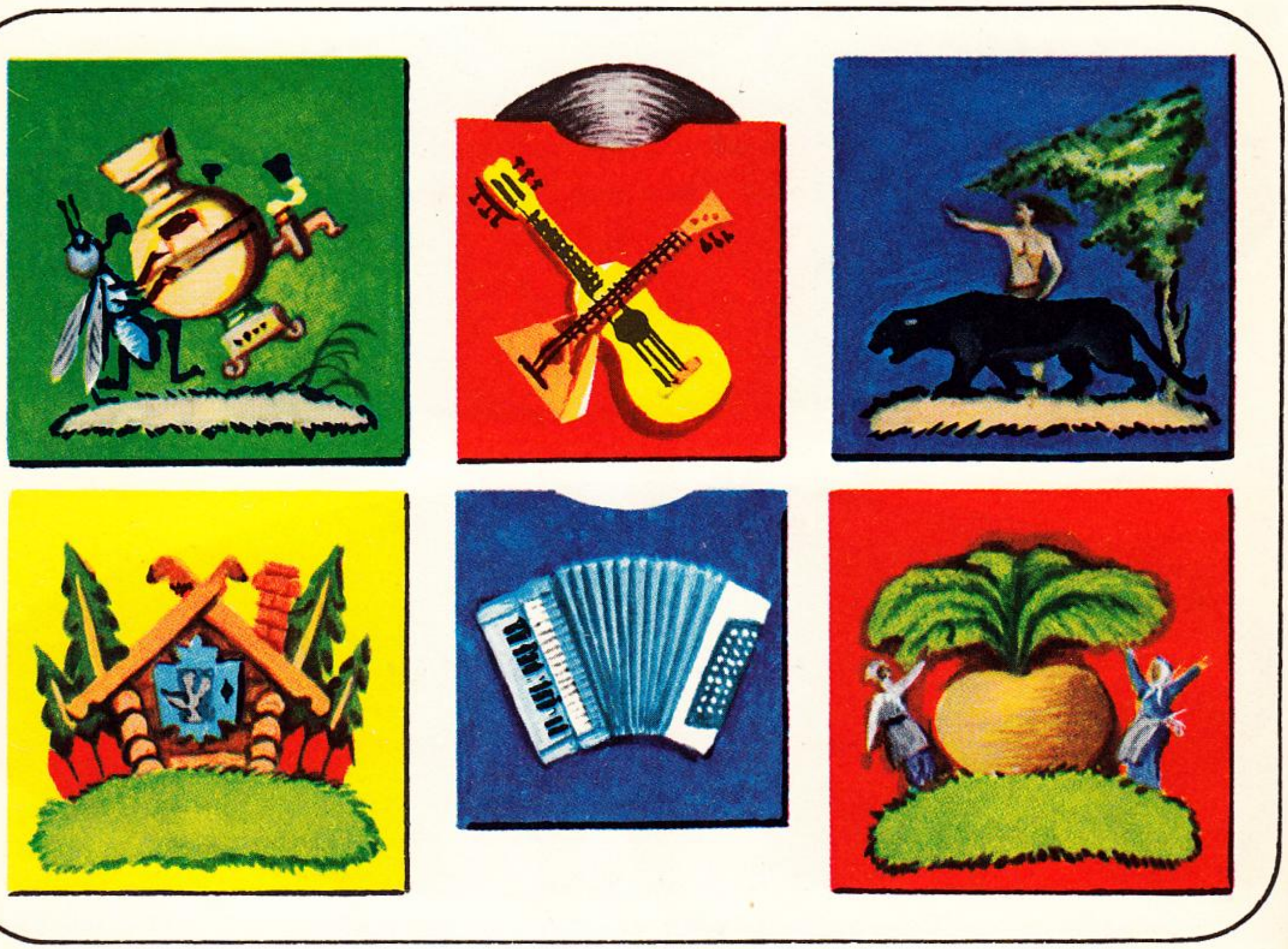
Or like that?



Do you help your mother lay the table?

EXERCISES EXERCISES

21. Marina is six and her parents have given her six records of fairy-tales and songs as a birthday present. Daddy advises Marina to put the records in different boxes according to subject — stories or songs, and size. Marina fetches one box. "I'm putting big records with fairy-tales in this one," she decides. How many boxes will she need altogether? Which records will go in each box? Look at Marina's records and say how many go in each box? Will there be any empty boxes? Why?



EXERCISES EXERCISES

22. Imagine you have a set of two birds and have to make a list of all the parts of the set.



One bird is a bullfinch and the other a tomtit. Here are the parts:



an empty set





one set of two birds



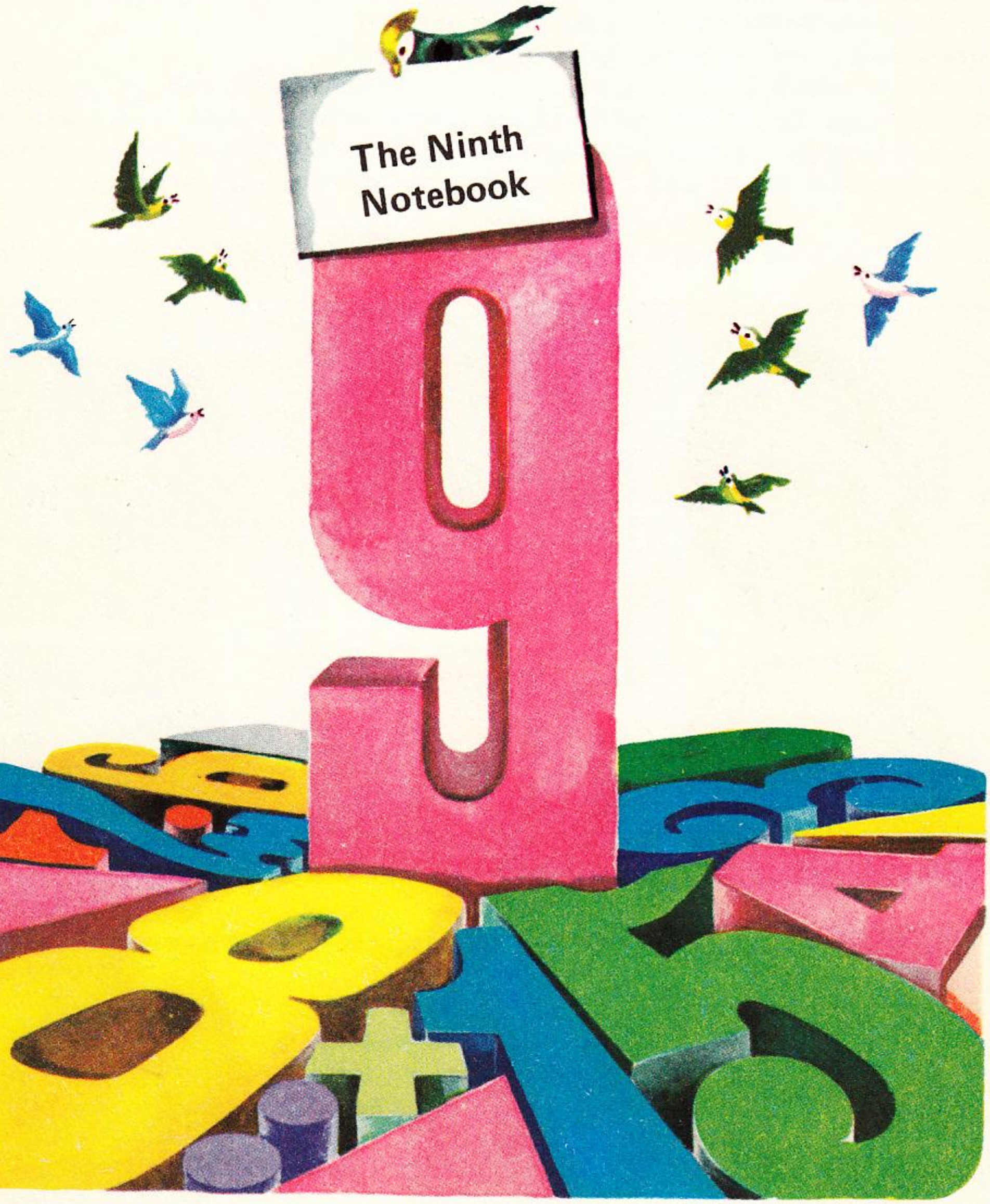
two sets of one bird

EXERCISES EXERCISES

Now let's imagine a set of three soft toys, a teddy-bear, a hare and a wolf. This set can be divided into eight parts. Say what they are.



23. What is the seventh month of the year? What is the eighth month of the year?


The Ninth
Notebook

The car was speeding along the road. Olya, sitting comfortably on Mummy's knee, was beginning to doze off. Petya was sitting with them in the back. Daddy was next to Uncle Misha who was driving.

"Why have we never been to Granny's and Grandpa's by car before, Uncle Misha?" Petya asked.

"We had to go by train because there wasn't a good road. But see what a good road they've built now! It's wide and smooth. We'll be there in no time."

"How far have we still got to go?"

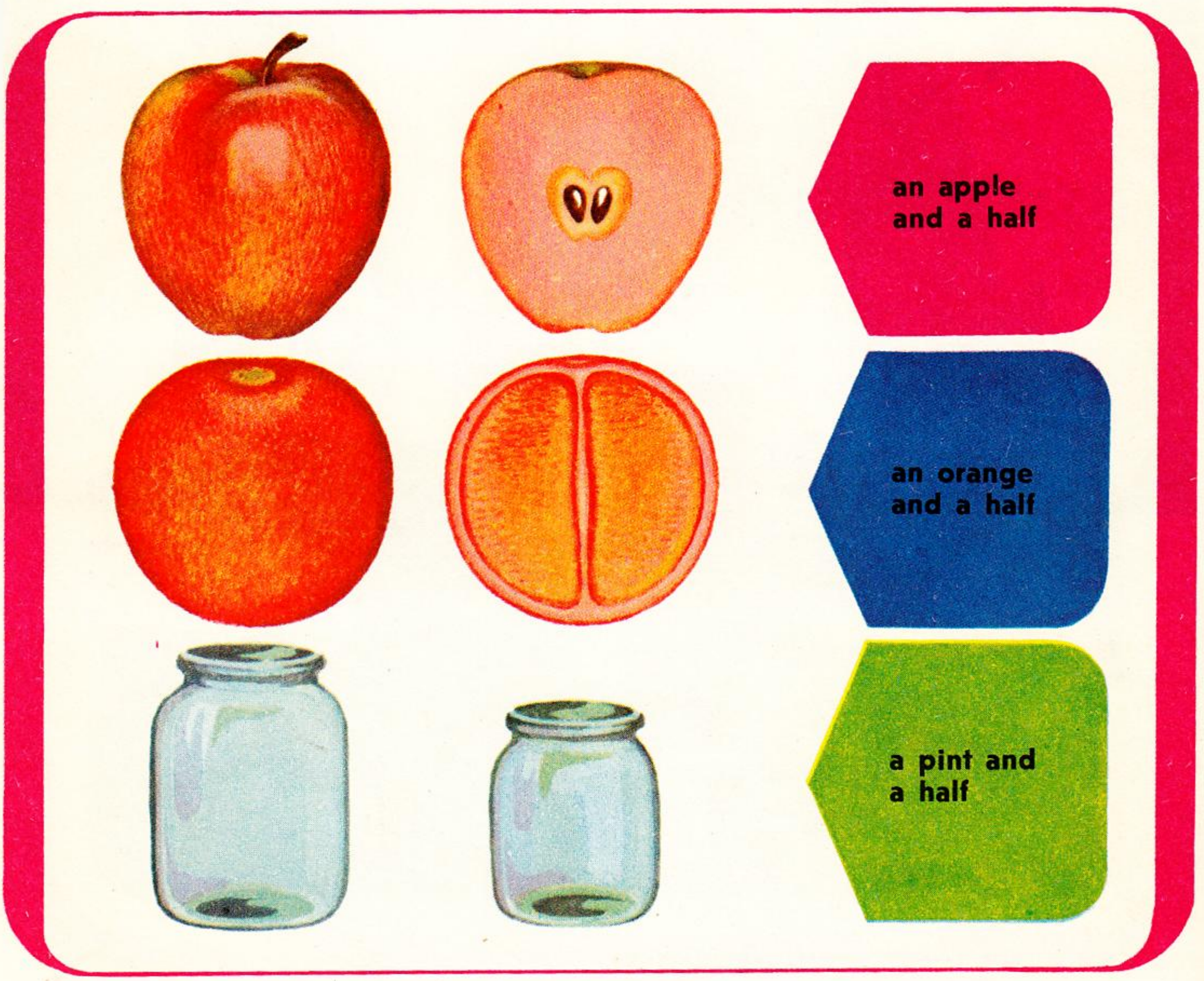
"It'll take another hour and a half."

"What's an hour and a half?"

"Don't you know what 'one and a half' means?"

"No."

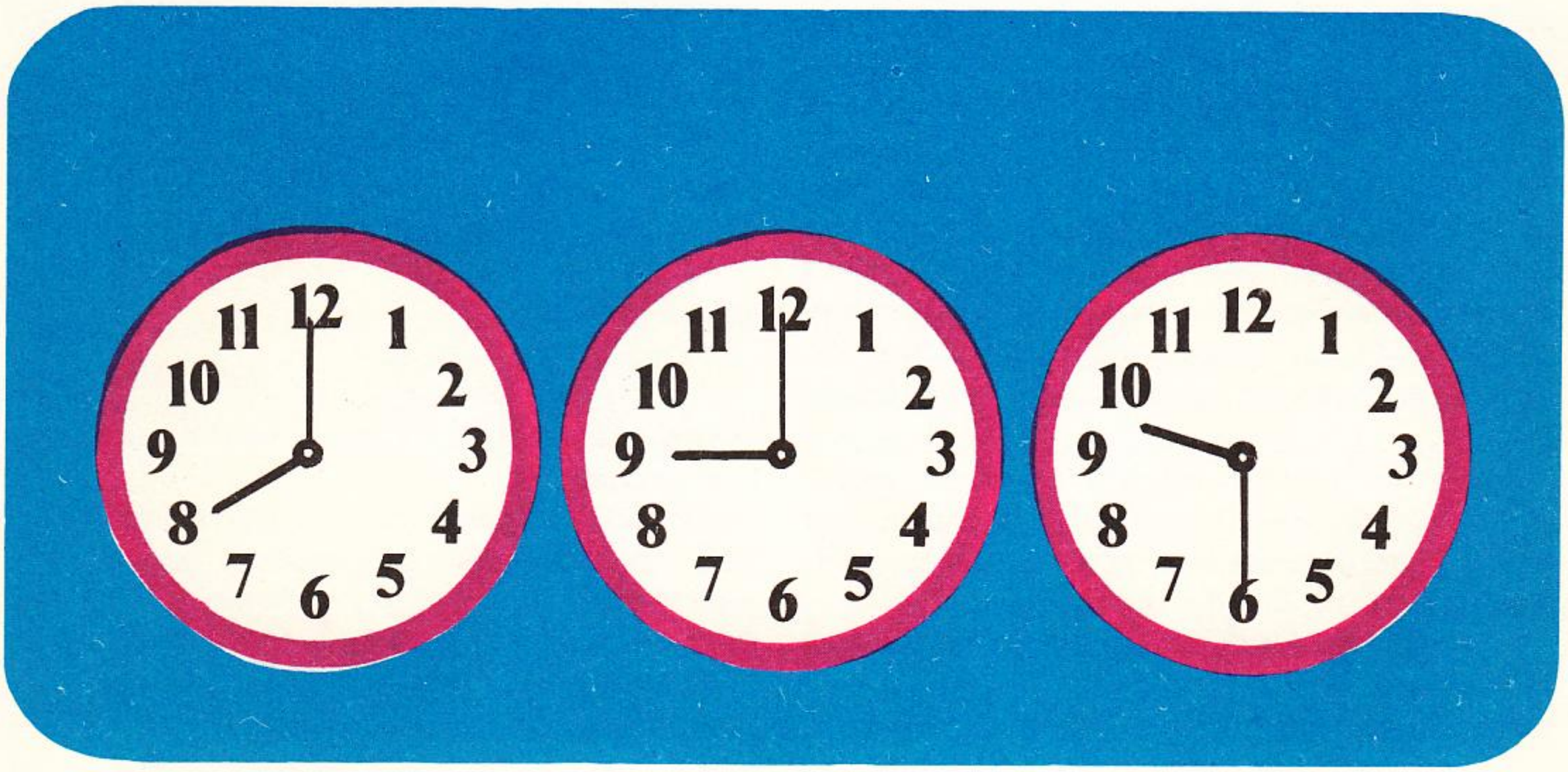
"Well, you'll see in a moment. You know what a half is. If you take something whole and then add half of the same thing, you get one and a half."



You give examples
of one and
a half
of anything you
can think of.

eight o'clock. The short hand, which is called the hour hand, is pointing to the eight. When the long hand, which is called the minute hand, has gone full circle, another hour will have passed and it will be nine o'clock. The short hand will have moved a bit too and it will then be pointing to the nine. And when the long hand has gone half way round again, another half hour will have passed. And then we'll know that it's an hour and a half since eight o'clock."

"I understand," said Petya.



"What about a car and a half?" suggested Petya.

Uncle Misha laughed. "You can think of anything you like. But personally I wouldn't be very happy about driving in half a car. Have it by all means, though, if you want to."

"No, I wouldn't want half a car either. How can you tell when an hour and a half has passed, Uncle Misha?"

"By looking at my watch. It's exactly

Do you understand?
Say where the two hands
will be an hour and a half
after three o'clock?
Draw two clocks
to show that an hour
and a half have passed.

They were all silent for a while. Petya nodded off. He dreamed of number nine. It was big and fat, floating in the air, and rocking slightly. Then suddenly it turned over and became a six. Then the tail began to grow and curve and it turned into an eight.

"How wonderful!" thought Petya as he slept.

Other wonders appeared. An eight suddenly split in two. One half was a three. The other was a three as well, but it was the wrong way round. Then the two parts joined up again to make an eight. Then again the eight divided up but this time it made two little noughts. They began to spin like the wheels of a car.

"Here we are!" he heard Daddy say suddenly. He opened his eyes and saw that the car had come to a halt in the yard behind Grandpa's house. Daddy lifted him carefully in his arms and carried him indoors. A moment later he was in bed fast asleep.

Early next morning the children woke at cockcrow. Petya and Olya jumped out of bed and raced each other into the yard. Granny came out to meet them.

"Well, children, did you sleep well?" she asked kindly. "Come. I'll pour you some fresh milk."

"I'd rather go with Daddy to get water from the well like last time," said Petya.

"There's no need for that, little man. We have running water now, so you can wash in the wash-basin, just as you do at home."

The children washed, had breakfast and ran out into the orchard to pick apples.

The big basket filled up quickly with sweet-smelling fruit.

Daddy and Uncle Misha carried the basket into the house.

"Here's the harvest, Mother," said Uncle Misha. "The first fruits of the year."

"Why do you call granny mother, Uncle Misha?" Olya asked in surprise. "Her name's granny."

Mummy smiled.

"She's granny to you, Olya, but mother to me and mother to Uncle Misha too. But to you and Petya she's granny."

Olya burst out laughing. "What a granny! Mummy and granny together! Is she really?"

"Of course. We all have different names to different people. Take Petya, for instance. He's your brother, my son and granny's grandson."

"And what am I to Uncle Misha?" asked Petya.

"You're his nephew."

"Talking maths again, are you?" Daddy asked, carrying an empty basket towards the orchard.

"What?" cried Petya. "Are brothers and sons and grandsons maths as well?"

"Oh, yes," said Daddy. "You know perfectly well that maths isn't just numbers and shapes. There are lots of other things in maths too. Relationships, for example."

"Why don't we study relationships, then?" suggested Petya.

"Why not?" agreed Daddy. He got out a sheet of paper.

"First we must show our whole family on paper. First the men, that's you, me, grandpa and Uncle Misha. We'll be little squares. And then the women — Granny, Mummy and Olya. They can be triangles. How many squares

and how many triangles do we need? How many shapes do we have to draw altogether!"

And what do you suggest?

You answer Daddy's question too.

"We need seven shapes," Petya said "Four squares and three triangles."

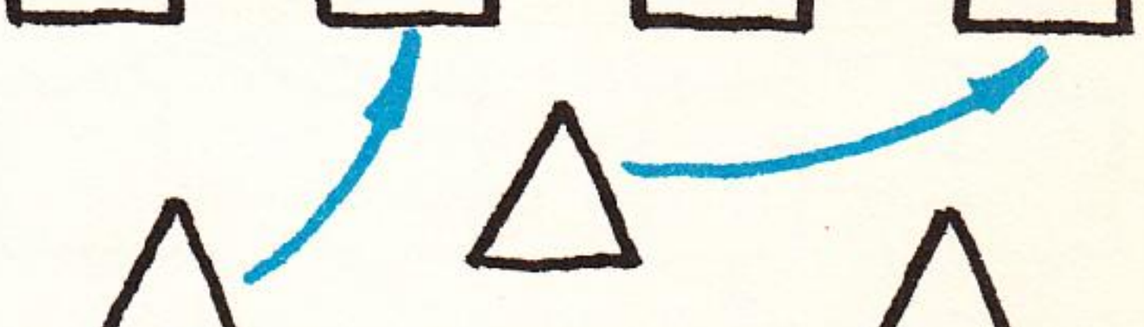
"That's it!" said Daddy. And here's what he drew.



"We could draw an arrow pointing to the son," said Petya.

"Yes. You can use arrows to show relationships. We can show the son in blue, for example. I mean, we can draw a blue arrow from parents to their sons. So you have blue arrows from Granny and Grandpa to Uncle Misha and from Mummy and me to you. The blue arrow sort of says, 'this is our son'."

"Will we draw arrows for daughters too?" Olya asked, who by the time became very interested in the game.



"Now," he went on, "let's think about how we're going to show the relationships between them. How do we show that someone is someone's son?"

"Of course," said Daddy.
"What colour?"
"Red," suggested Petya.
"All right," Daddy agreed. "Daughters

can be red. A red arrow says, 'this is our daughter'. Well, Petya, where do the red arrows go?"

Show where the red arrows go.

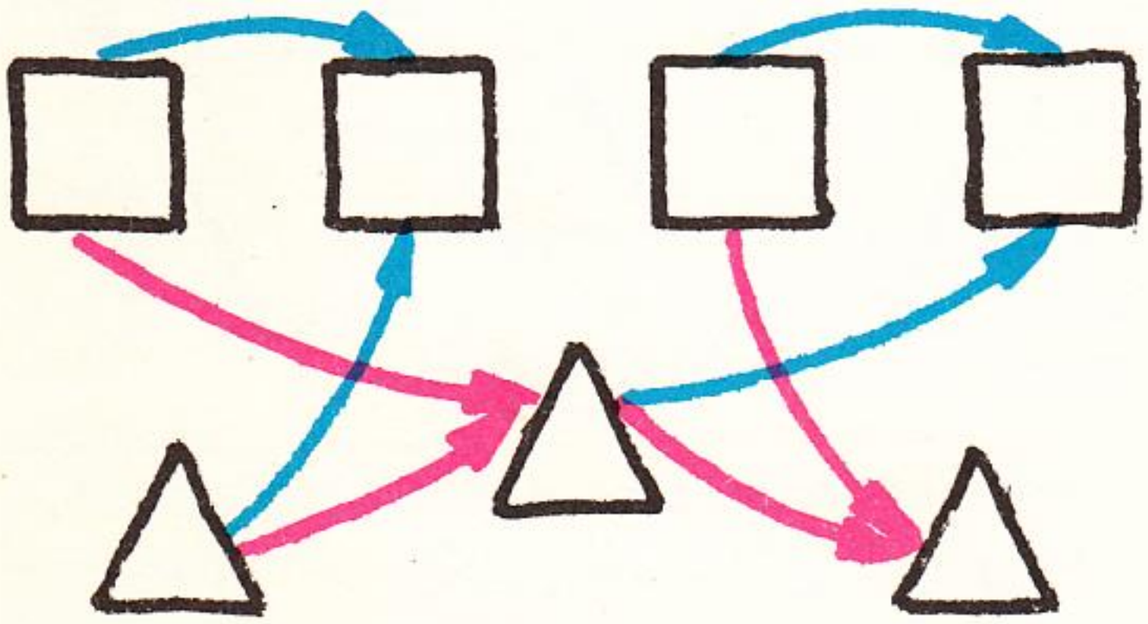
"From Mummy and Daddy to Olya," said Petya.

"Is that all! Isn't there any one else!"

"Oh! Mummy! You're a daughter too! You're Granny and Grandpa's daughter. We have to put red arrows from Granny and Grandpa to Mummy."

"That's right," Daddy agreed. "Let's put them in then."

"Look, here comes Uncle Misha."



"What's going on here! I want to draw too."

"We're not drawing, Uncle Misha. We're showing relationships," Petya explained.

"Whose relationships!"

"Ours. The squares and triangles on the paper mean us. The squares are the men and the triangles are the women."

"Ah," said Uncle Misha, interested. "In that case there must be a square for me. Where am I!"

"No, Uncle Misha. I'm not going to tell you where you are. You must work it out for yourself."

Can you guess which square is Uncle Misha!

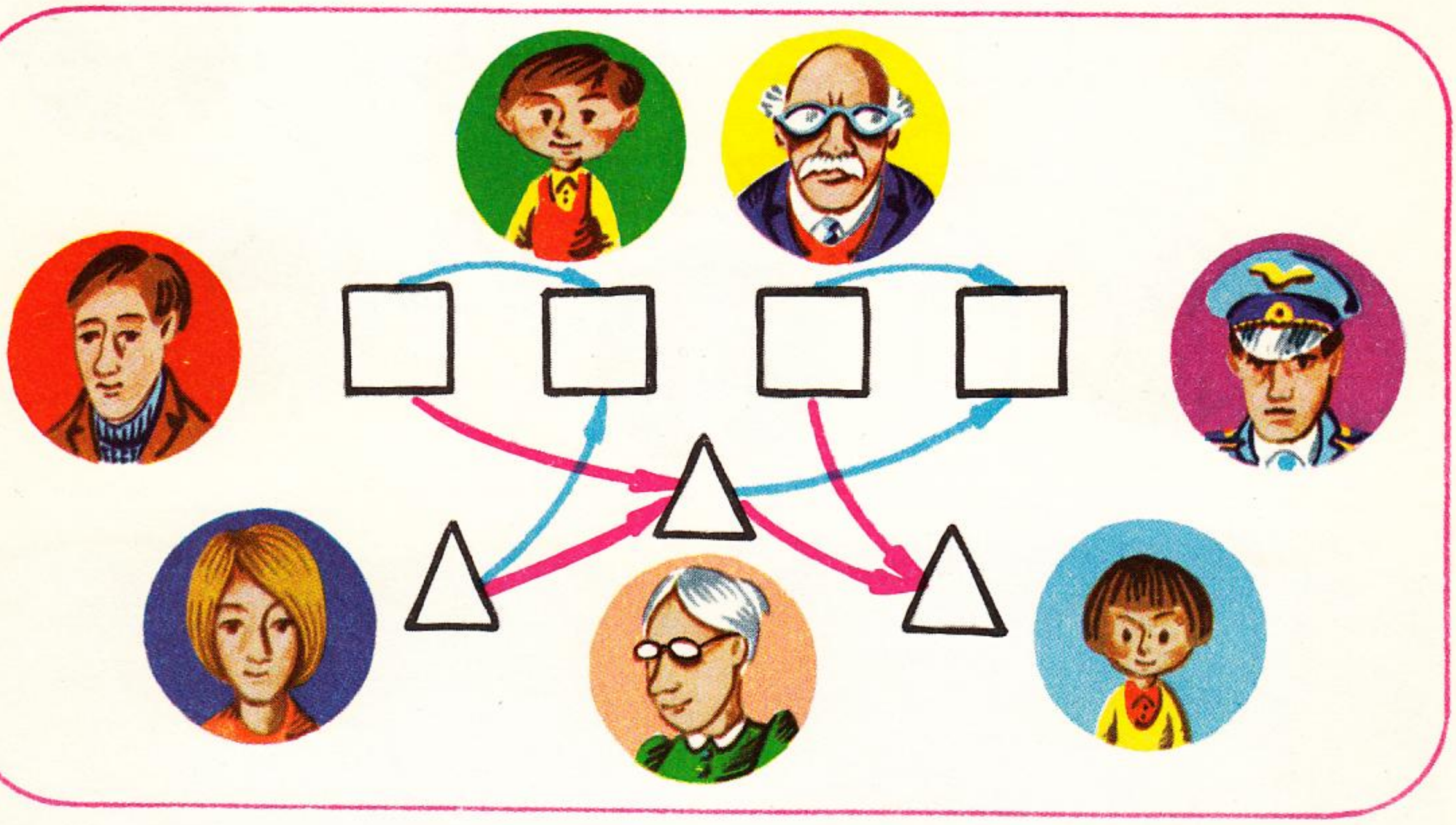
"Difficult..." said Uncle Misha. "I'll have a try though. But first you must tell me what the arrows mean."

Petya explained. "The blue arrows show who's a son, and the red arrows show who's a daughter."

"Ah... Now I'll tackle the problem," Uncle Misha said slowly. "Which arrow is meant to be me!" he went on, as if talking to himself. "Just a second. Two squares have blue arrows pointing at them. One of them must be me and the other must be Petya. I know! The second square on the left is me."

"How did you guess!" Petya asked in astonishment.

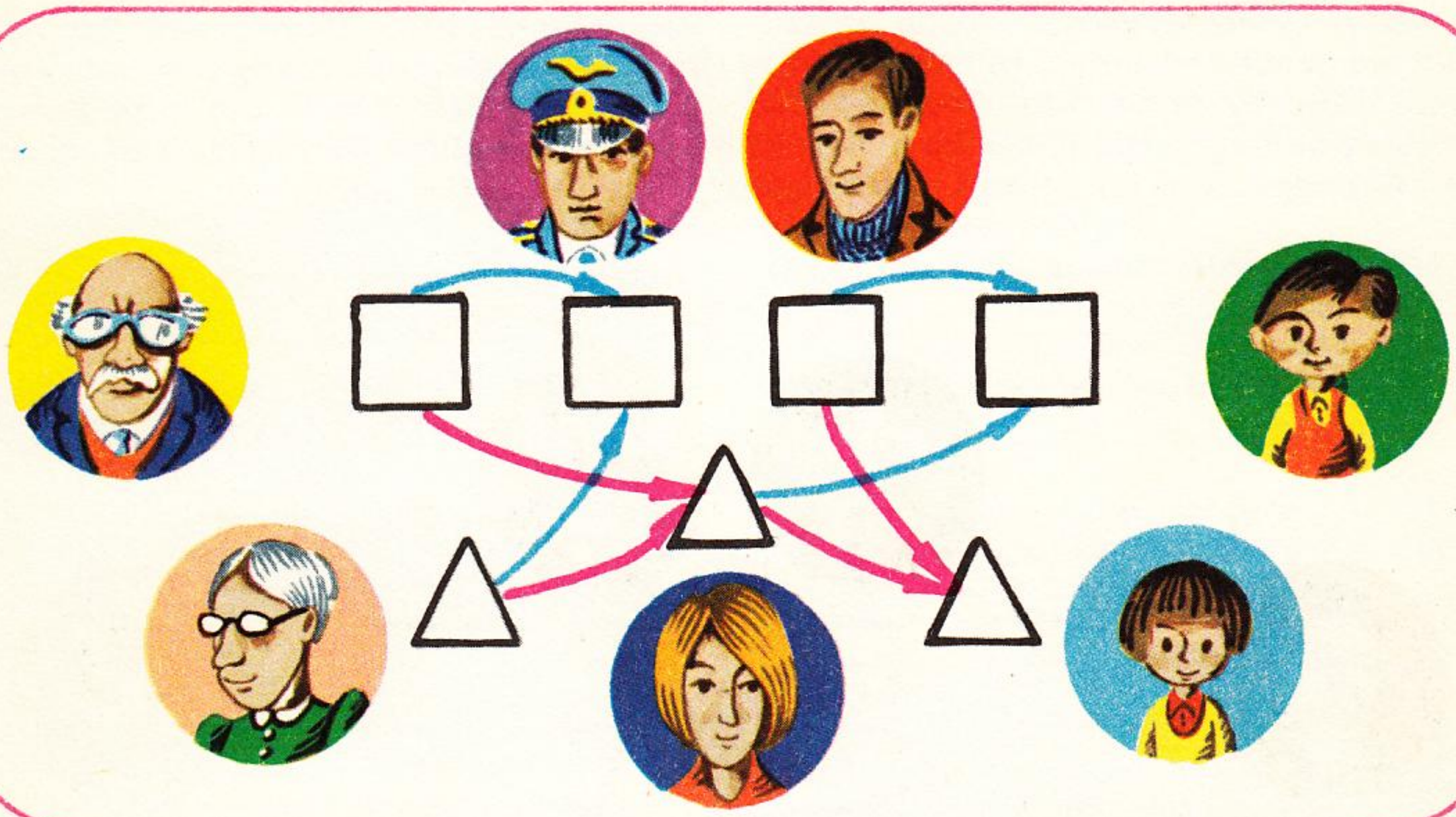
"Easy! If the second square on the left isn't me, it must be Petya. In that case, I'm the last square on the right. Then the blue arrows pointing to me come from Granny and Grandpa, and the arrows pointing to Petya come from Daddy and Mummy. In that case the little triangle in the centre is Granny. But she turns out to be Petya's parents' daughter. So that must be wrong. It doesn't make sense."



Do you see anything
in this drawing
that can't be right!
Say what it is.

Petya burst out laughing. "That's funny. Granny's Mummy's daughter! Why, it's even funnier, Uncle Misha. Look! Olya is Granny's daughter." He laughed again.

"So," Uncle Misha went on, "since it's obviously such nonsense, it must be wrong. The last square on the right can't be me. So I must be the second square on the left. If that's me, then all the rest is right too."



"Well, Petya, are you satisfied with my explanation?"

"Yes."

Did you understand
Uncle Misha's explanation?
Try to go over
it on your own.

"Let's draw them all again," said Uncle Misha. "That'll help us remember. We'll do it just as we did before, with little squares and triangles. Now, Petya, where are we to put the yellow and brown arrows?"

"But we haven't drawn any arrows to show brothers," Petya said.

"We'll do that now. And sisters too. What colour arrow shall we have for a sister? Olya... You say."

"Yellow," said Olya.

"All right. Now, Petya, you choose a colour for a brother."

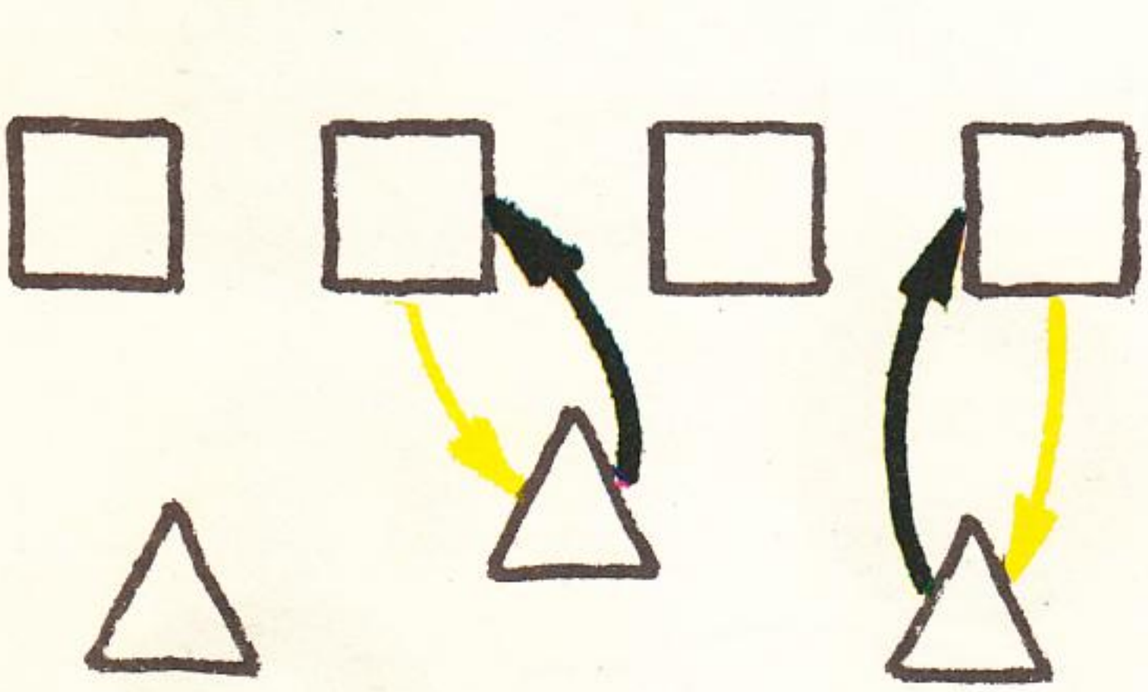
"Brown."

Say where you think
they should go.

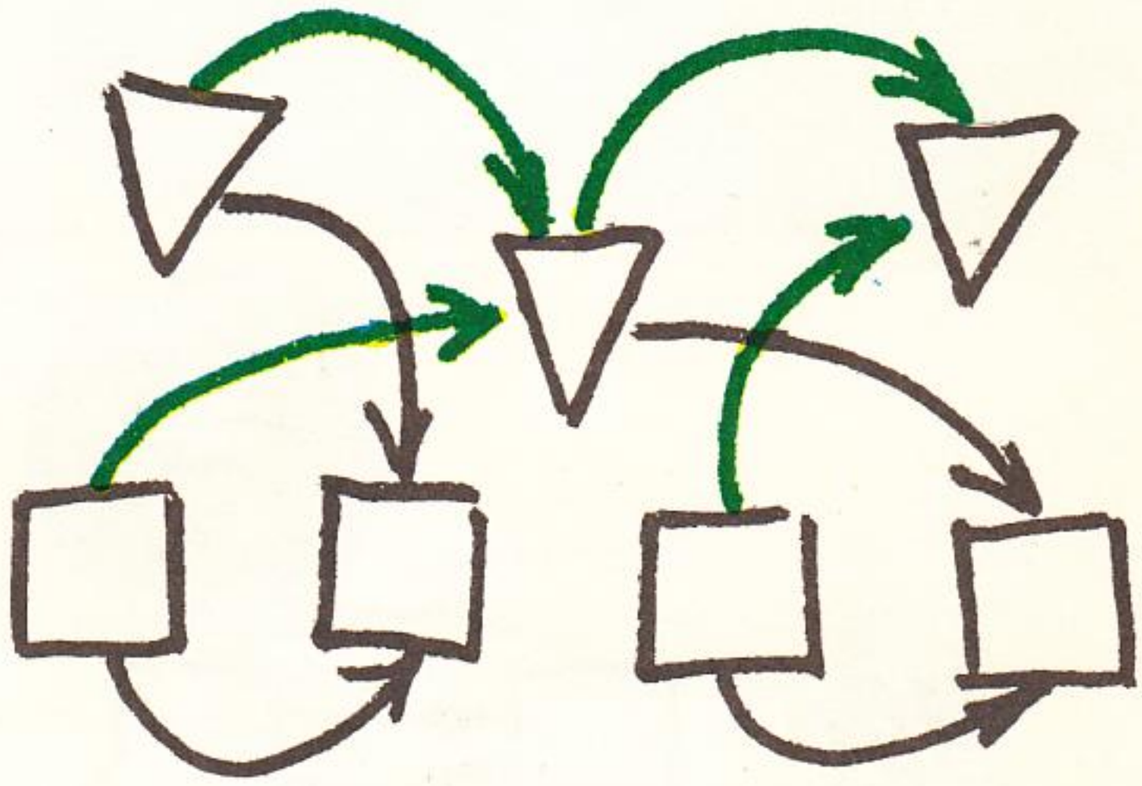
"The yellow arrows go from me to Olya and from Uncle Misha to Mummy," said Petya. "And the brown ones go the other way, from Olya to me and from Mummy to Uncle Misha."

It didn't take Petya long to make his drawing.

When he had finished he showed it to everyone. He was thrilled with himself.



Is he right?



Look at Petya's drawing.
Can you tell which arrows
point to a father
and which to a mother?

"Good," said Uncle Misha. "And now we have to show who's whose mother and who's whose father. What colours shall we use for that?"

"May I choose?" asked Petya. "I'll think it all out for myself. I'll draw it and then I'll show it to you."

"The black arrows point to fathers and the green ones point to mothers," Petya explained.

"Well done!" said Uncle Misha.

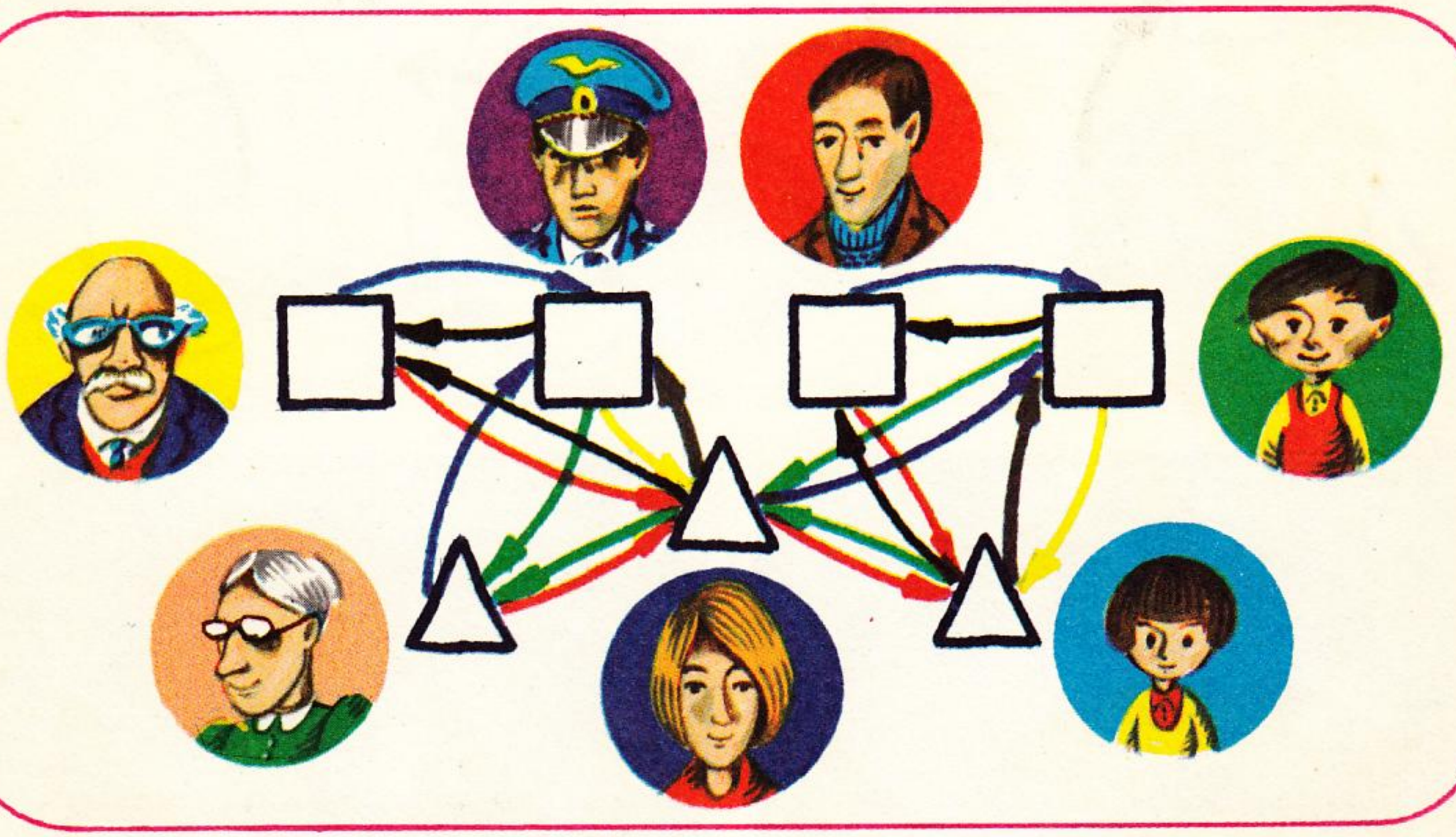
Then Petya got really interested in showing all sorts of relationships with arrows. "Let's draw all the arrows we've

drawn on two different sheets of paper on one sheet. Then we'll be able to show all the relationships together."

Uncle Misha shook his head.

"That'd be too complicated. It'd be very hard to make out who was related to whom."

"It doesn't matter. I'd understand it," Petya said. "Look!"



Look carefully at this drawing and say what each arrow means.

"Hurrah! Here comes Grandpa!" Olya cried. "Oh! He's caught lots of fish!"

Everyone looked round. Sure enough, there was Grandpa. He had set off to fish in the small hours when they were all fast asleep and now he was coming back with an excellent catch. He greeted the grown-ups and kissed the children. Then he said, "Well, I've certainly provided fish soup for lunch. What have all you people been doing?"

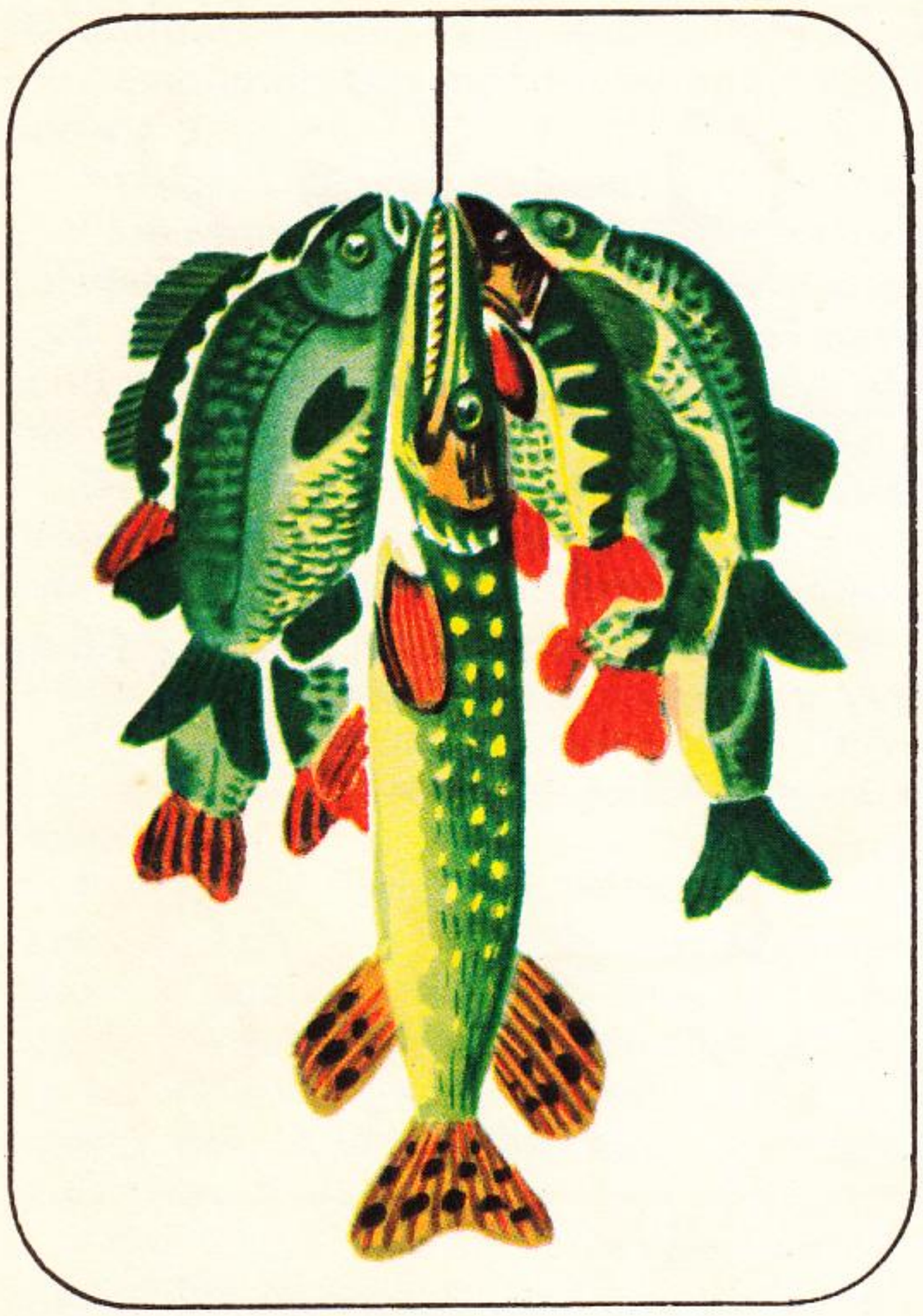
"We've been picking apples," Olya said.

"And doing maths," Petya put in.

"Maths?" repeated Grandpa. "Well, that's a sound business. But you're not at school yet. What sort of maths are you doing?"

"It's very interesting," Petya said. "And we've been doing it for ages. I know a lot."

"Is that a fact? You must be able to count then. Can you count the fish in my catch?"



Petya looked at the catch. "Of course I can. It's easy. You've caught nine fish."

Is Petya right!

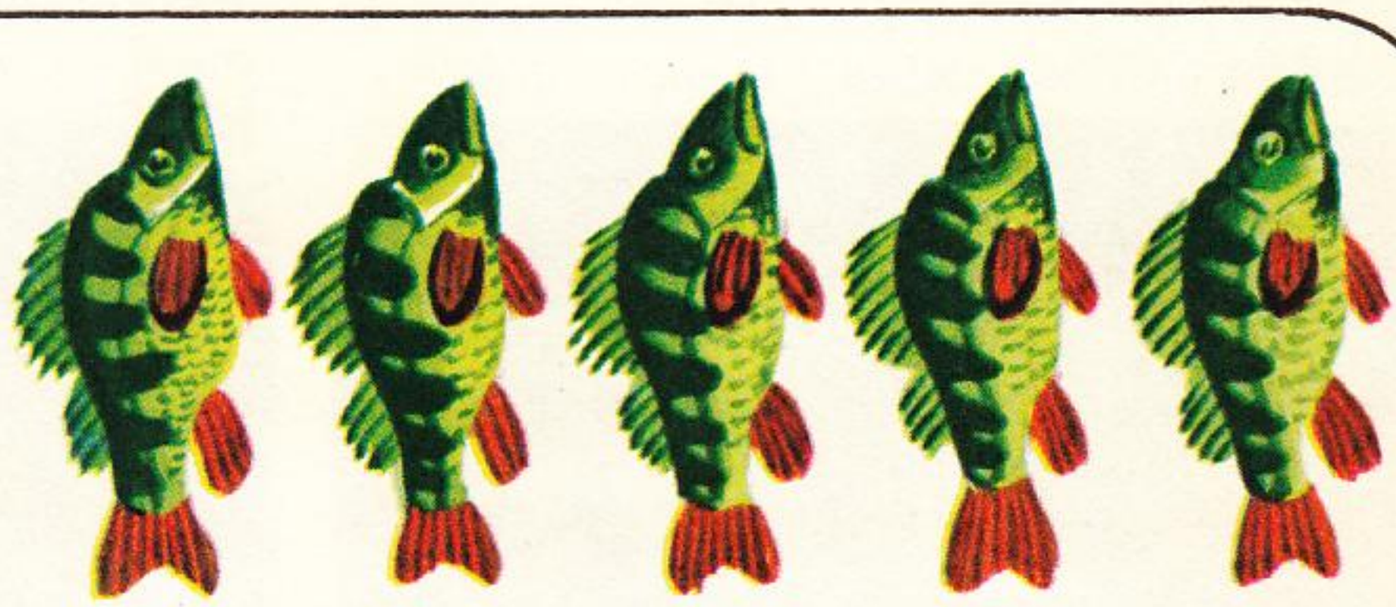
"That's it," said Grandpa. "You certainly can count. What else do you know?"

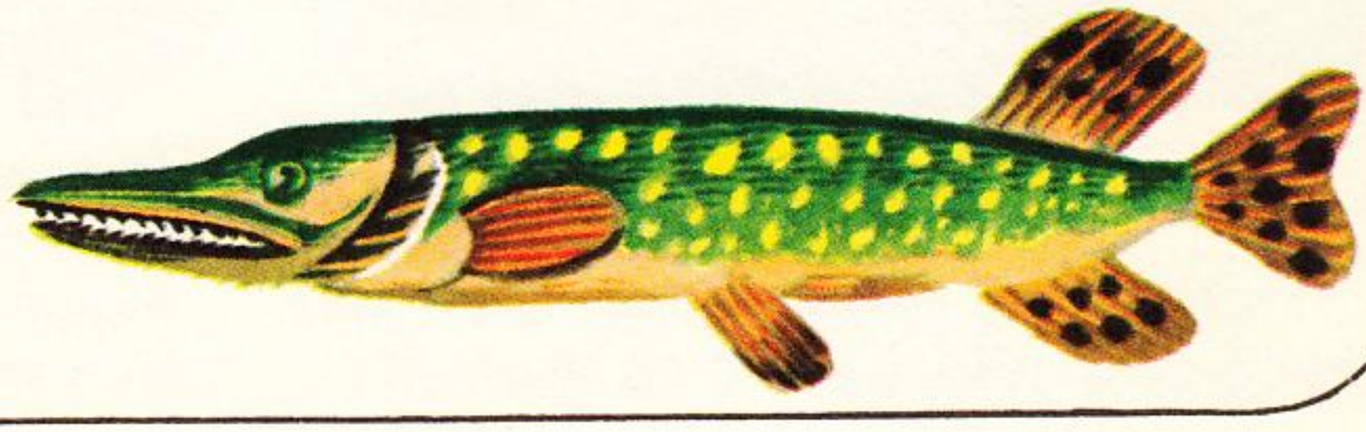
"I know sets and parts."

"What's all that about?"

"Well," explained Petya, "you can say, 'Grandpa has caught a set of fish.' And then you can divide the set into three parts — a set of perch, a set of bream and a set of pike."







"How interesting," said Grandpa with a smile. "Go on."

"The set of perch has five fish in it, the set of bream has three fish and the set of pike one."

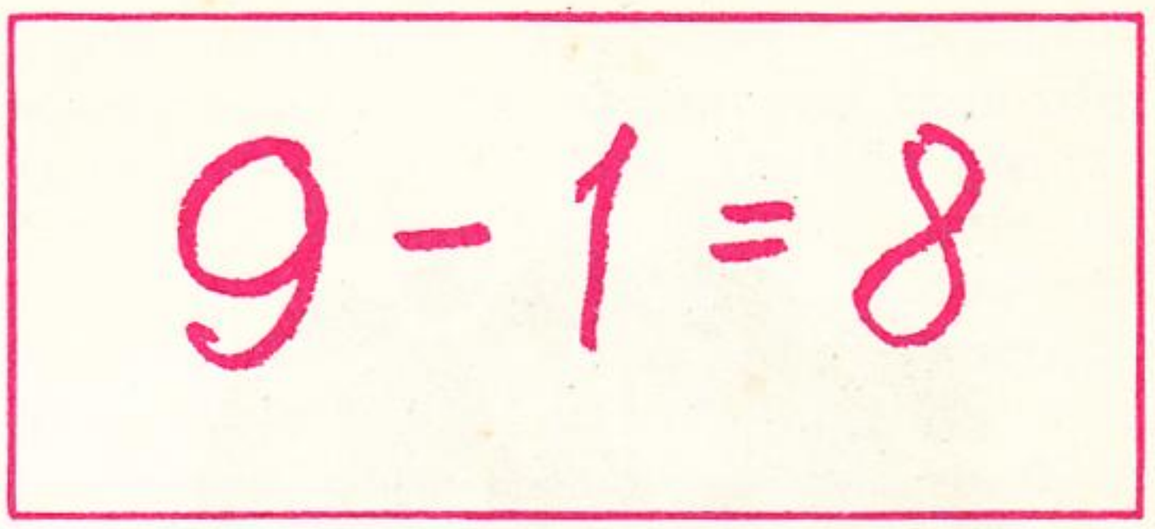
"So one pike is still a set," said Grandpa wonderingly. "Even though there's only one, eh?" He winked at Daddy.

"Yes. Daddy explained it to me. It doesn't matter how many things are in it. It's still a set. Even if there's nothing in it."

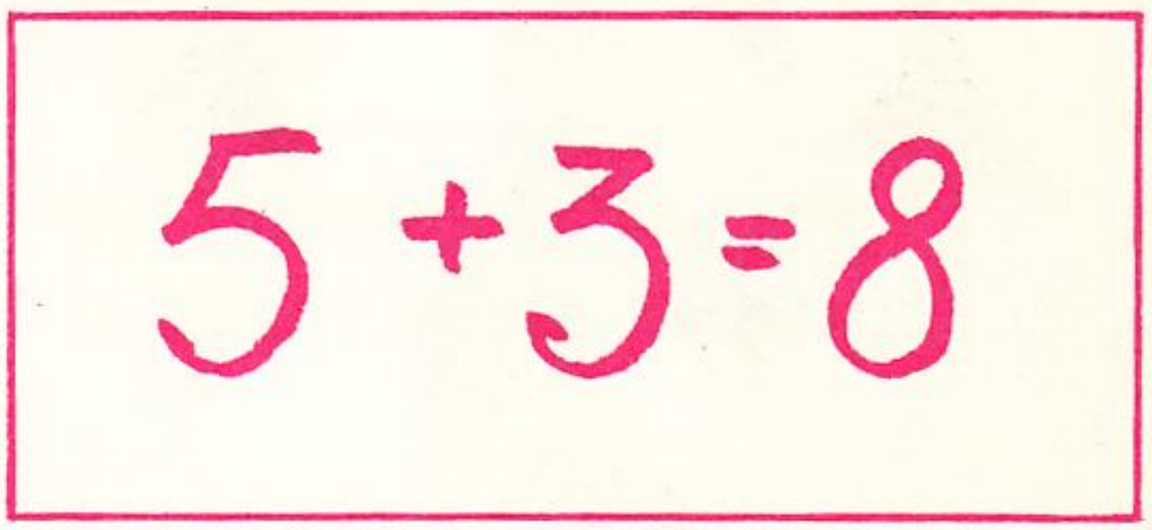
"And can you write numbers?" Grandpa asked.

"Yes. Numbers and various other signs. Plus, minus. Multiplication and division signs. The equals sign. We always write our sums down and then we write the answers too. Think of a sum, Grandpa, and I'll write down the answer."

"A sum, is it? All right, then. Mind you, it's not very difficult. We're going to make fish soup. But the pike isn't going into the soup. It's going into a pie that Granny's making. How many fish does that leave for the soup?"



"You did. But you know, there's another way you can get that answer.



How do you have to go about it to get the answer that way?"

Answer Grandpa's question. How did you work out the answer? Write it down.

Can you guess how you do it that way?

"Eight," said Petya. "Nine minus one leaves eight. Did I get it right, Daddy?"

Petya looked carefully at what Daddy had written, then he looked at

Grandpa's catch. "I've got it. You have to remember the parts!" he cried excitedly.

"Y-yes. Can you tell me a bit more!"

"There are three parts in Grandpa's set of fish," Petya explained. "Two of them are going into the soup, the set of perch and the set of bream. So you add five and three."

Grandpa listened to Petya, obviously enjoying his explanation. He exchanged looks with Mummy, and winked at Uncle Misha. "See what a splendid grandson I have!" he seemed to be saying.

"Well, old man," he went on to Petya, "I can see you're very good indeed at maths."

Petya was delighted. "I'm not an old man, though," he said teasingly to Grandpa. "If you call me 'old man', it'll mix up all the relationships. Olya and me have to be the youngest, otherwise none of it works out. And relationships are maths, you know."

"Are they!" asked Grandpa. And he raised his eyebrows.

"Of course they are. Today we've been showing different relationships with coloured arrows. You're a square and Mummy's a triangle and there's a red arrow from you to Mummy because she's your daughter."

"And there are yellow arrows too," said Olya. "They mean 'this is my sister'."

"And all you have to do," Petya went on, "if you want to know who's who, is look at the arrows. Uncle Misha looked at them and he was able to tell which square was meant to be him. Can you find the square that's you, Grandpa!"

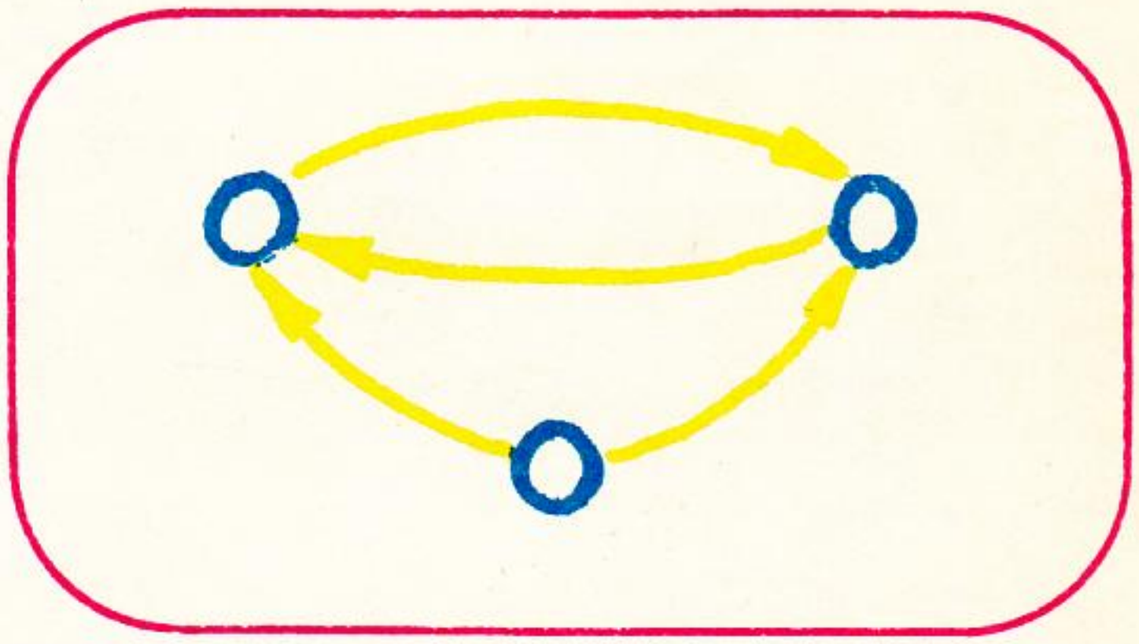
"Let me see..." said Grandpa. He put his glasses on. "This one," he said at length.

"That's right," said Petya happily.

Just then he noticed that Uncle Misha was drawing a new picture. Immediately he asked.

"What's that, Uncle Misha! Are you drawing more relationships!"

"Yes. This is a new sum which I've made up for you and Grandpa. Watch. This is



a family with three children, Yura, Masha and Natasha. I've shown them as circles."

"Why circles!" Petya wanted to know. "Yura should be a square and Masha and Natasha should be triangles."

"No," said Uncle Misha. "The same things can be done differently in different drawings. The only thing is, you have to decide what's going to be what. In the other two drawings we did it was easier to do men as squares and women as triangles. But that won't do this time because the question here is to find out which of the three circles is meant to be Yura. OK!"

"Yes," Petya nodded. "And what do the yellow arrows mean! What relationships are they meant to show!"

"The arrows are the same as before. A

yellow one says, 'this is my sister.' Clear!"

Do you see what the question is! Try to answer it.

"Let's see if we can work it out, Petya," said Grandpa. "Could Yura be the top circle on the left!"

What do you think?

"Of course not!" said Petya. "The circle on the left has two arrows pointing to it. So it's a sister to this one. And to that one." He pointed to the other two circles. "So the circle on the left isn't Yura, is it!"

"No," Grandpa agreed.

"And the circle on the right isn't Yura either. It also has two arrows pointing to it. So Yura must be the one at the bottom. Right!"

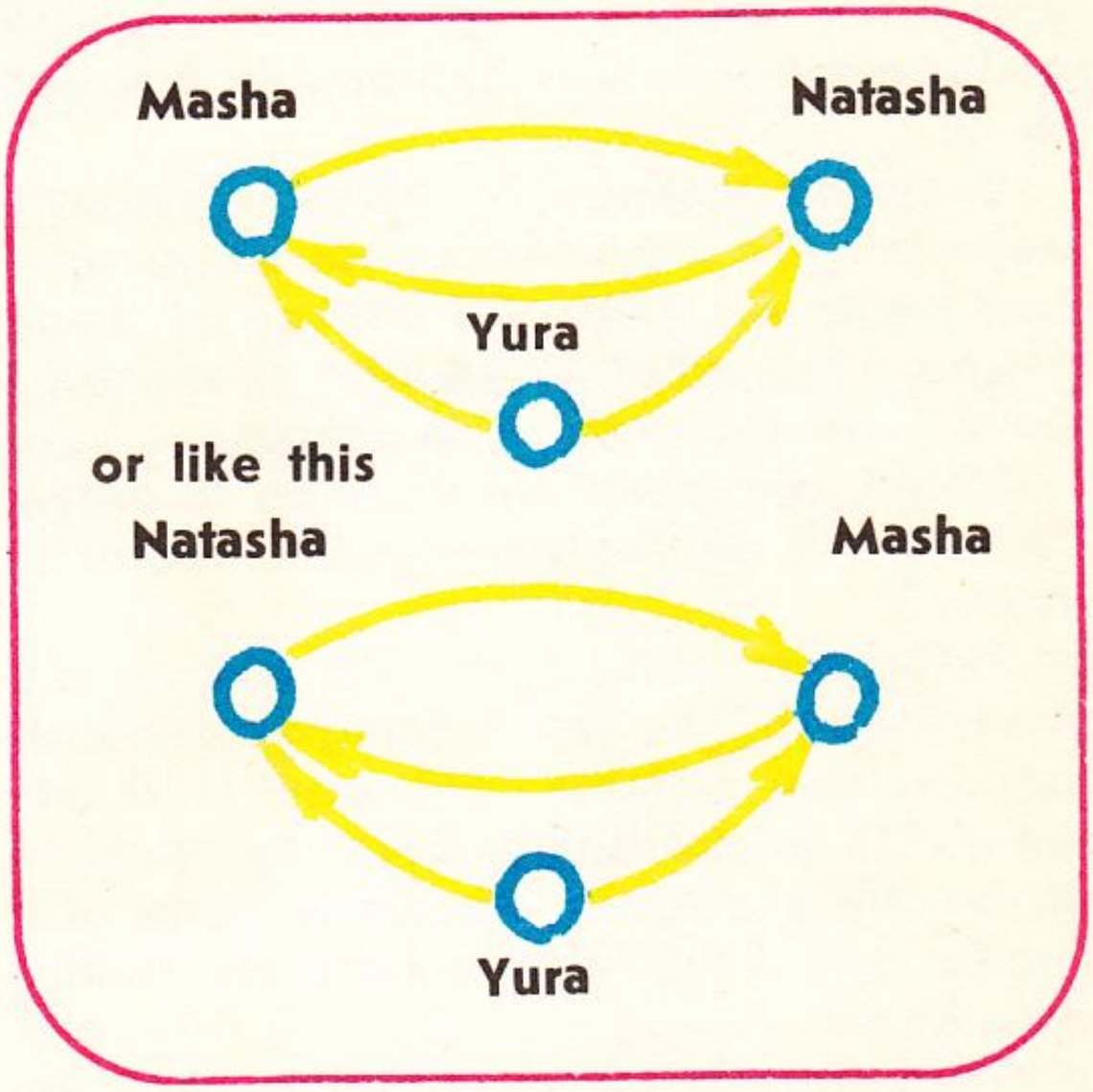
Grandpa nodded, and Petya cried, "We've done it, Uncle Misha. The bottom circle is meant to be Yura."

"Very good," said Uncle Misha. "But can you tell me which is Masha and which is Natasha!"

Think about the question.

Petya looked at the drawing for some time. Then, hesitantly, he replied, "I don't know... I don't think so."

"Quite right. You can't tell from the drawing. Because it could be like this."

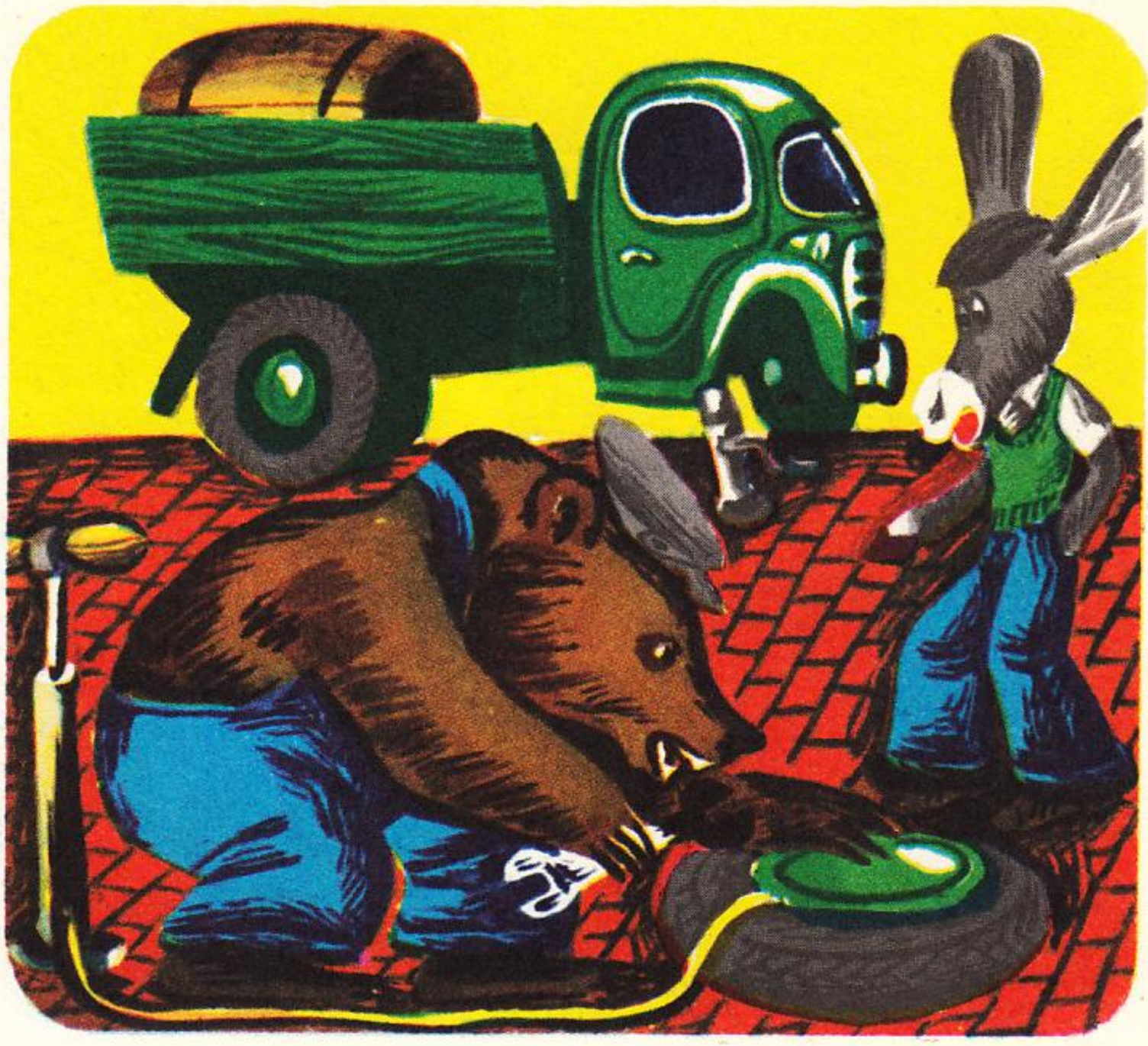


Just then Granny came out. "It's time you let the children go, Michael. They need to run about a bit."

"We've just finished," said Uncle Misha. "We'll go and pick some more apples and after that we'll all go down to the river."



HOW LYAPA THE DONKEY SOLVED SOME PROBLEMS



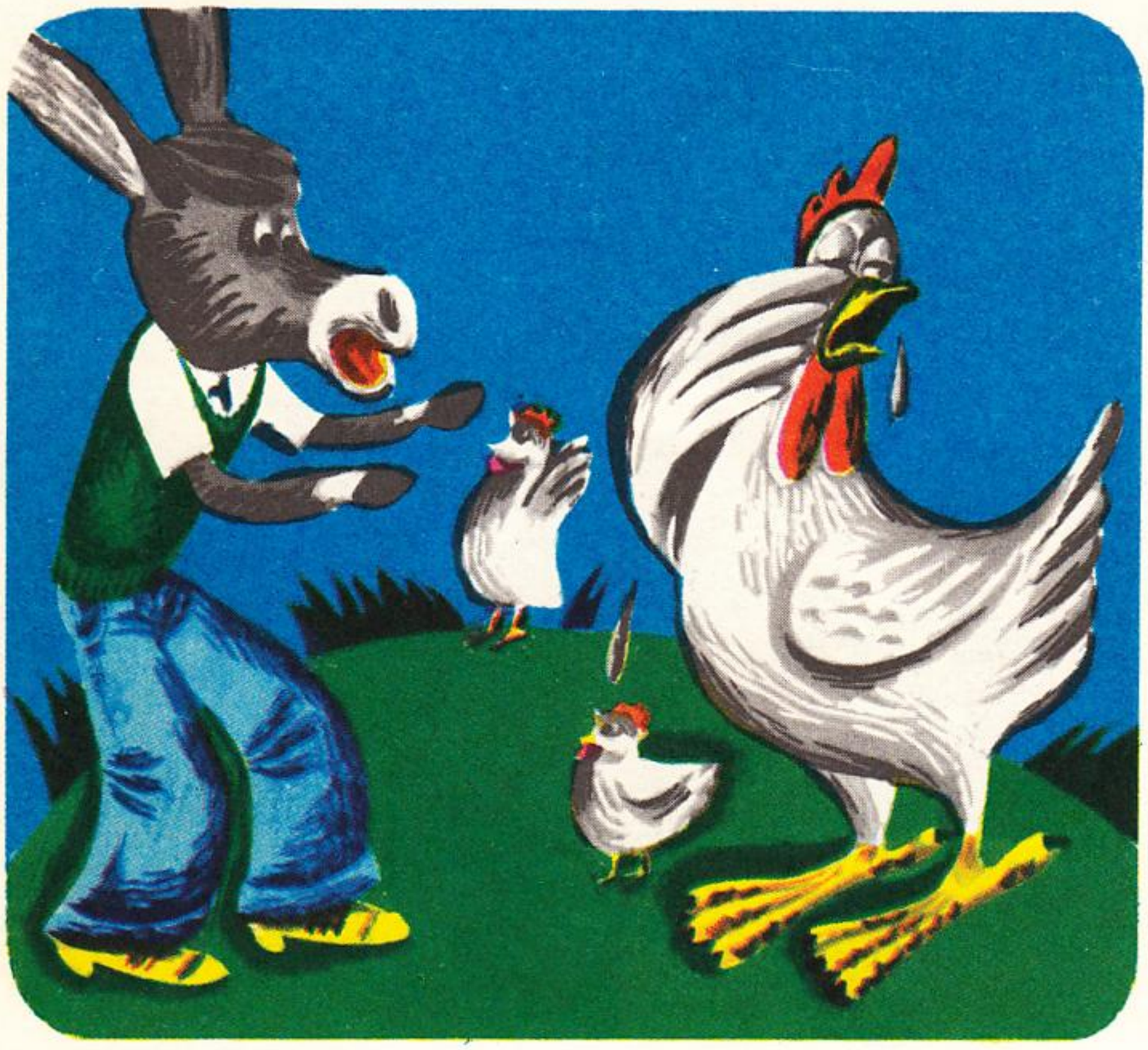
LYAPA: Hi, Bear, what are you doing standing on the road?

BEAR: I'm fixing my lorry. The wheel's broken.

LYAPA: Don't bother with that old wheel. I've seen a good one. It's not far away. I'll fetch it and we'll put your lorry in order in no time.



BEAR: But what sort of wheel is this! It's from a child's bicycle. Just imagine how it would look on my lorry. No, thanks, Lyapa, I don't need your help. I'll sort it out for myself.



LYAPA: Why are you crying, hen? What's the matter?

WHITE HEN: I'm in trouble. I took my four chickens out for a walk. I only looked away for a moment and now look—there are only two chickens left. I don't know where to look for the others.

LYAPA: Don't cry. I'll find them in no time. Here are your chickens.

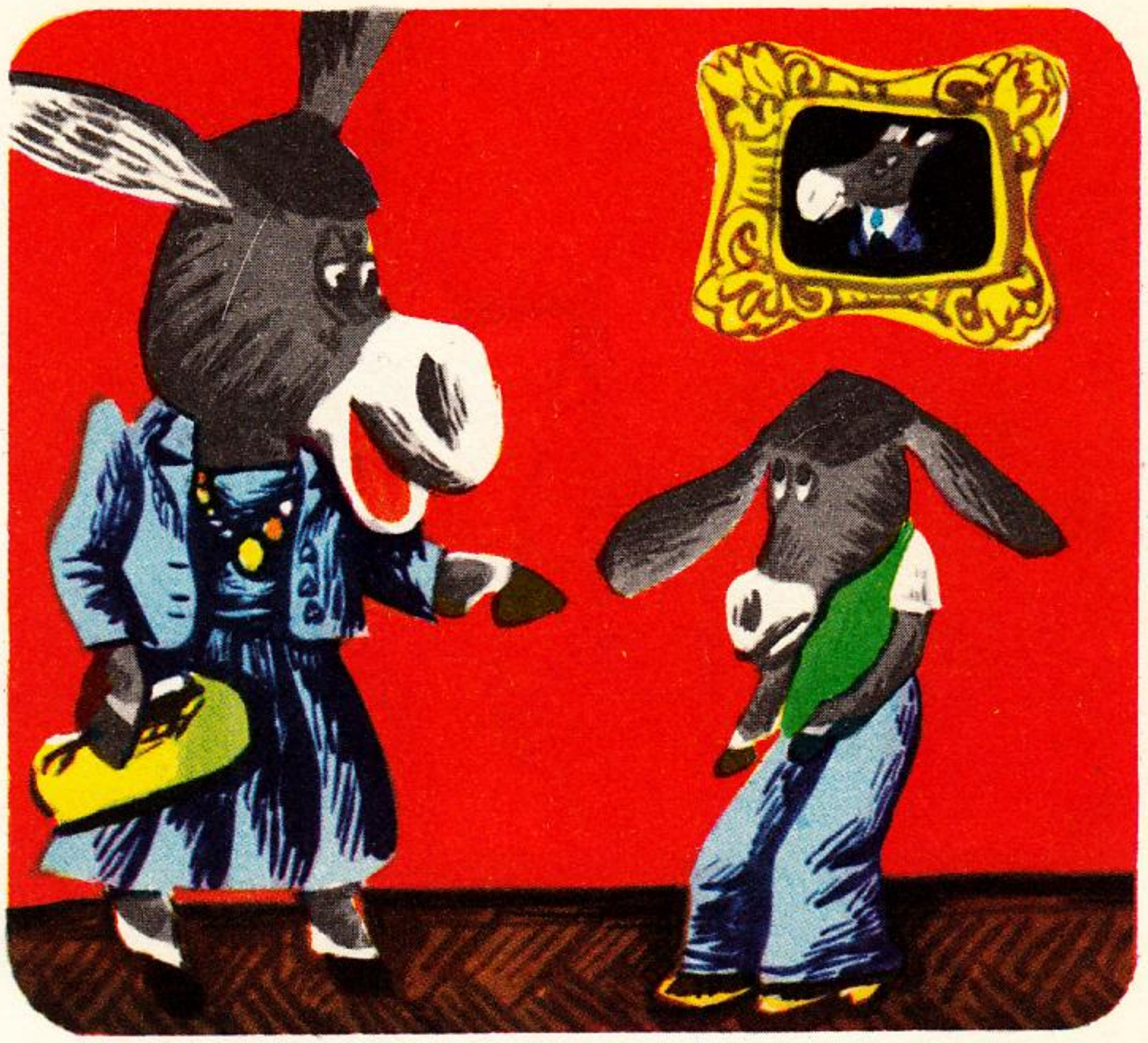


WHITE HEN: Are they mine? But mine were white!

BLACK HEN: What have you stolen my chickens for, Lyapa?

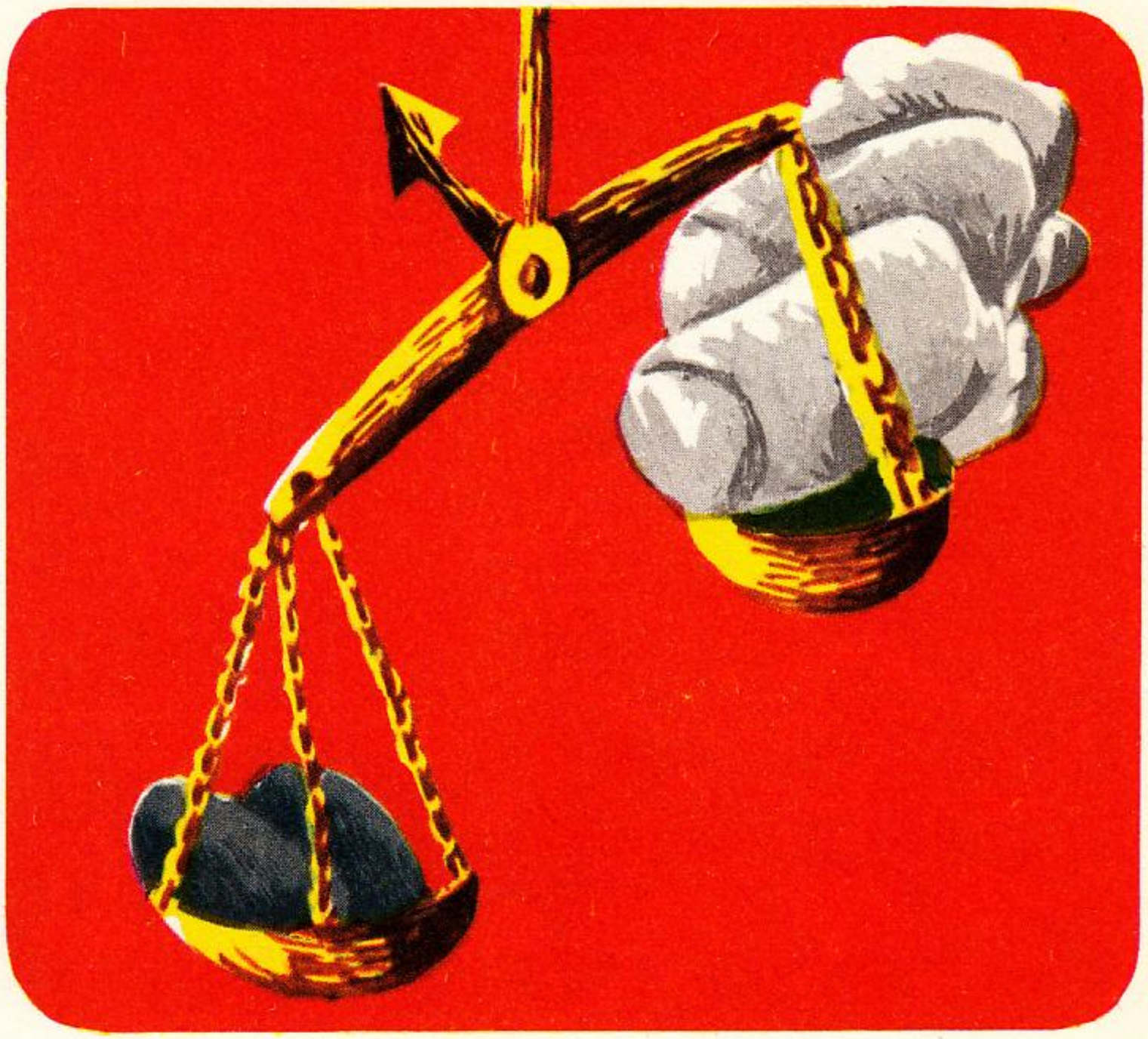
LYAPA: I wanted to help the white hen. She's lost hers.

BLACK HEN: That sort of help's no use. We'd rather look for the white chickens ourselves. It's much too difficult for you.



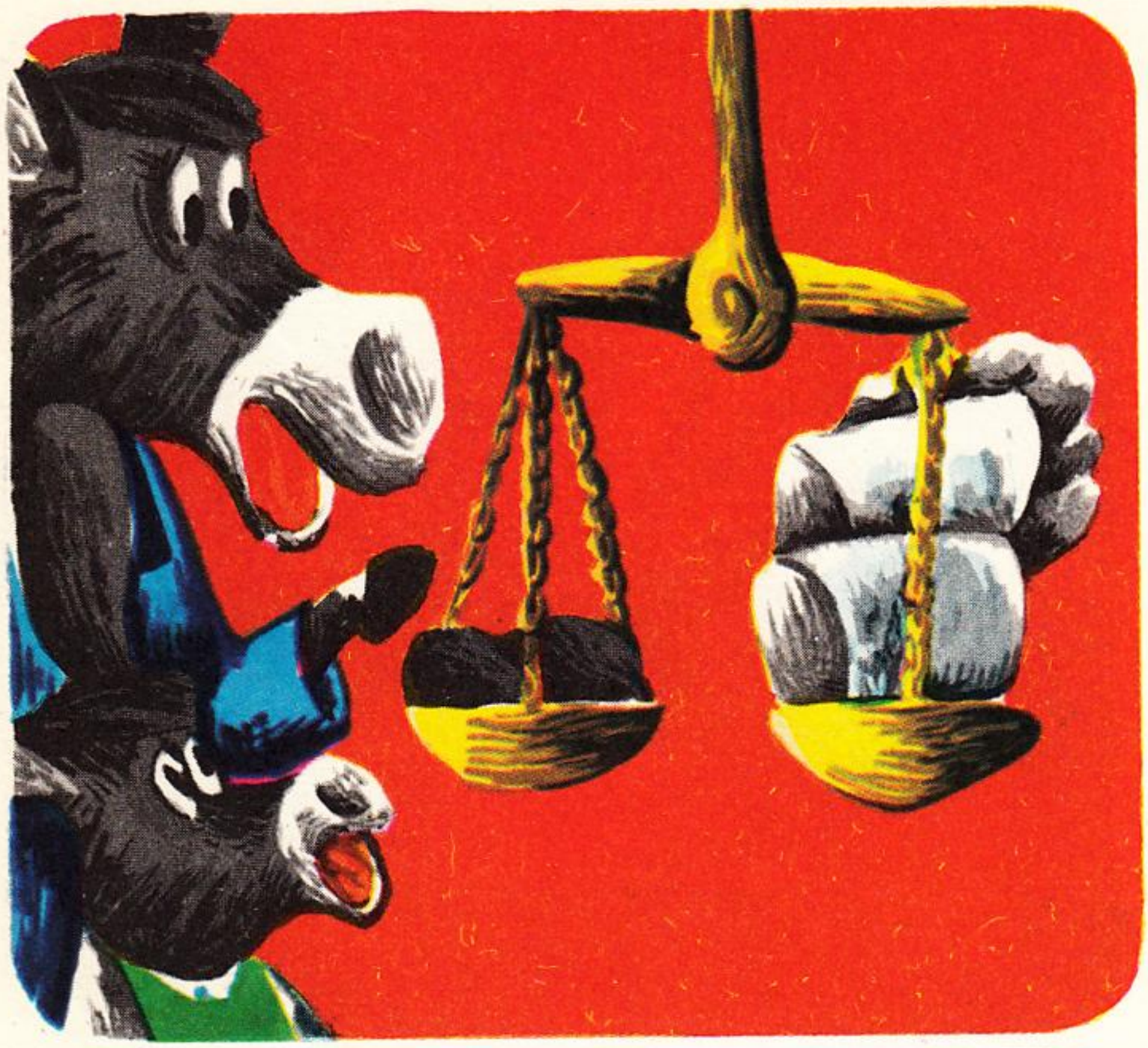
LYAPA: Why does everything I do go wrong, Mummy? I keep mixing everything up.

MUMMY: It's because you know so little and you never think. You've got to learn a lot before you can start solving problems.

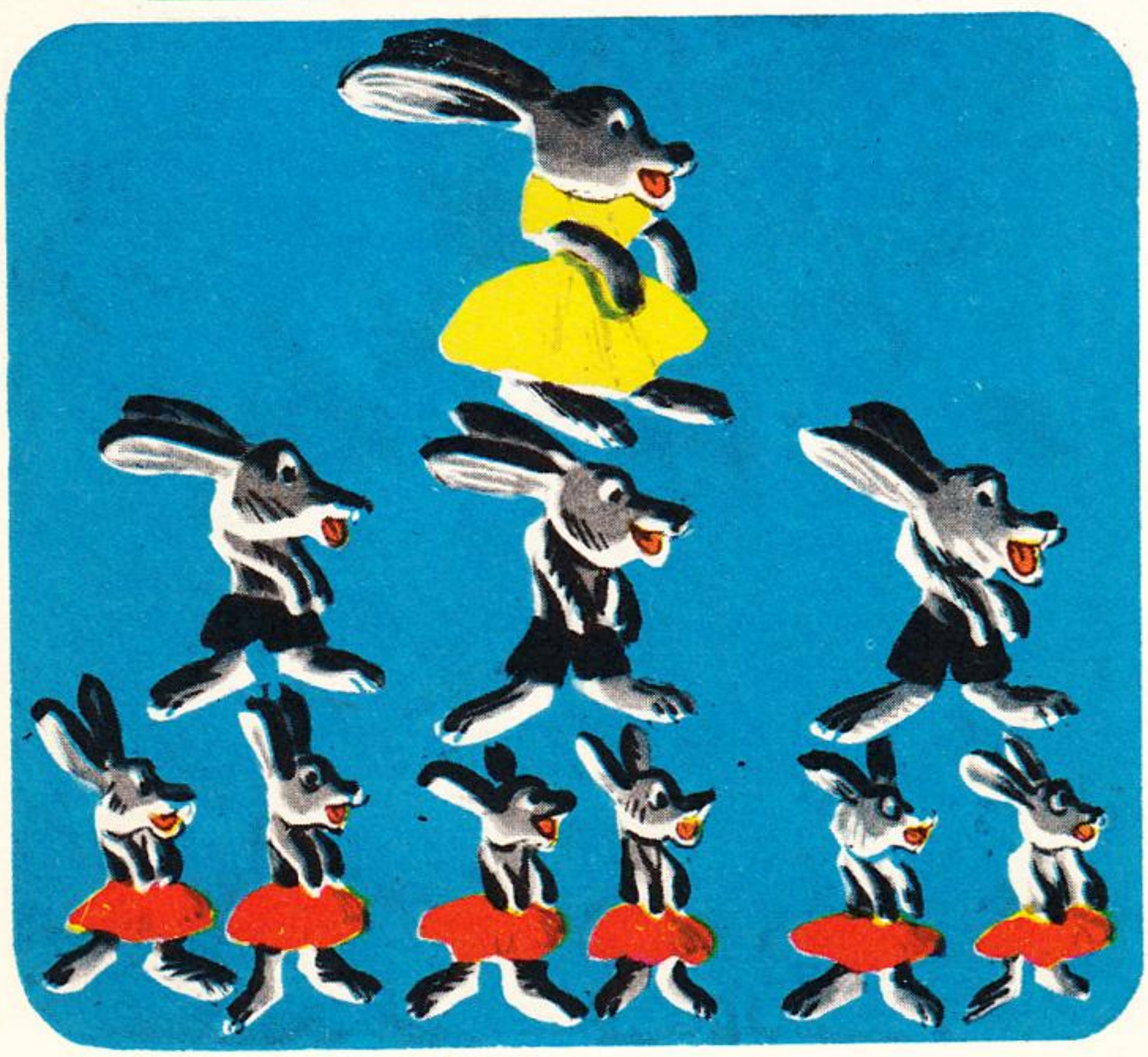


Here's one for you. Which is heavier, a pound of stones or a pound of cottonwool?

LYAPA: Stones, of course. I got that right, didn't I?

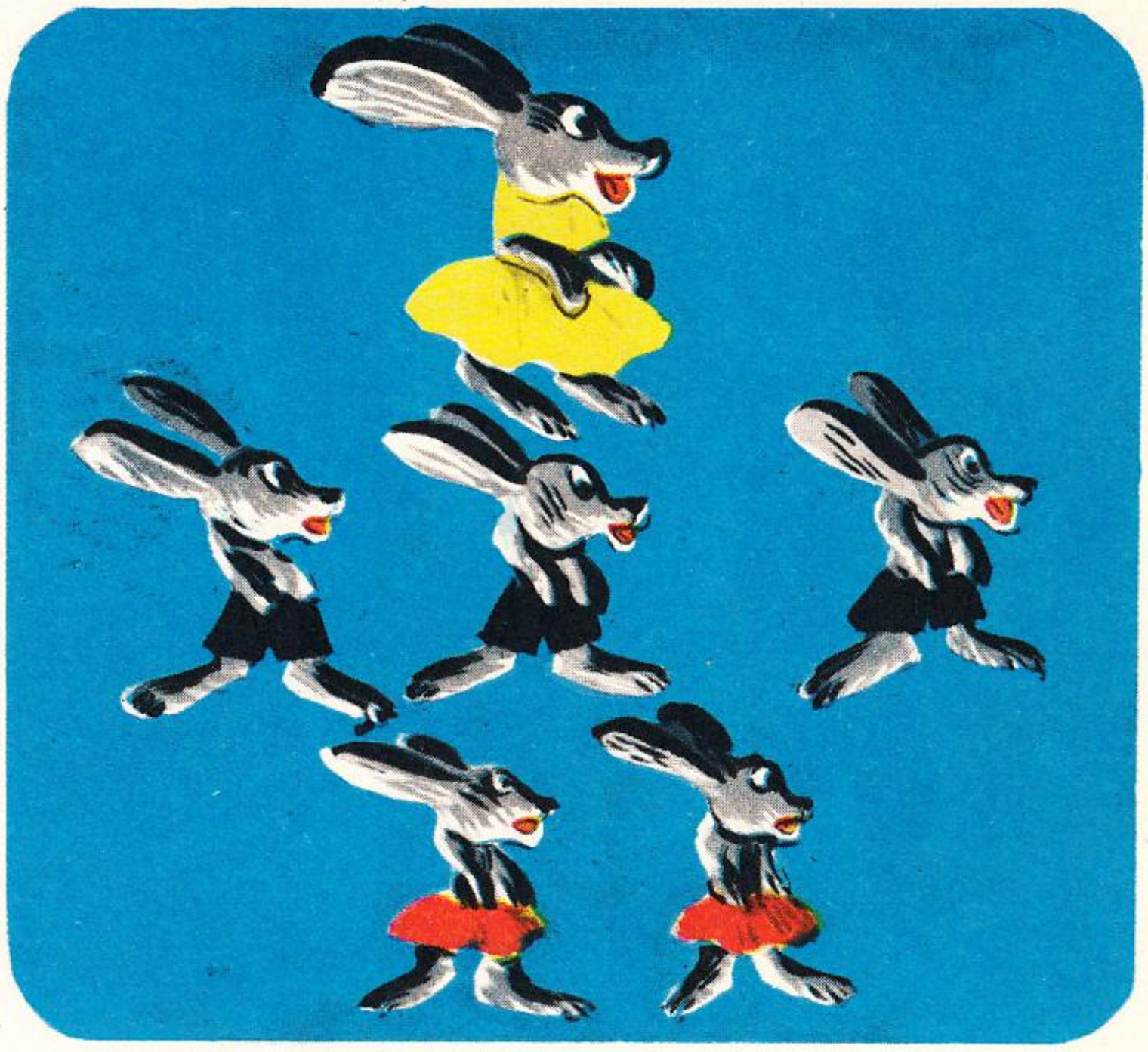


MUMMY: No, you didn't. You're careless, Lyapa. The stones weigh a pound and the cottonwool weighs a pound as well. They're both the same weight.



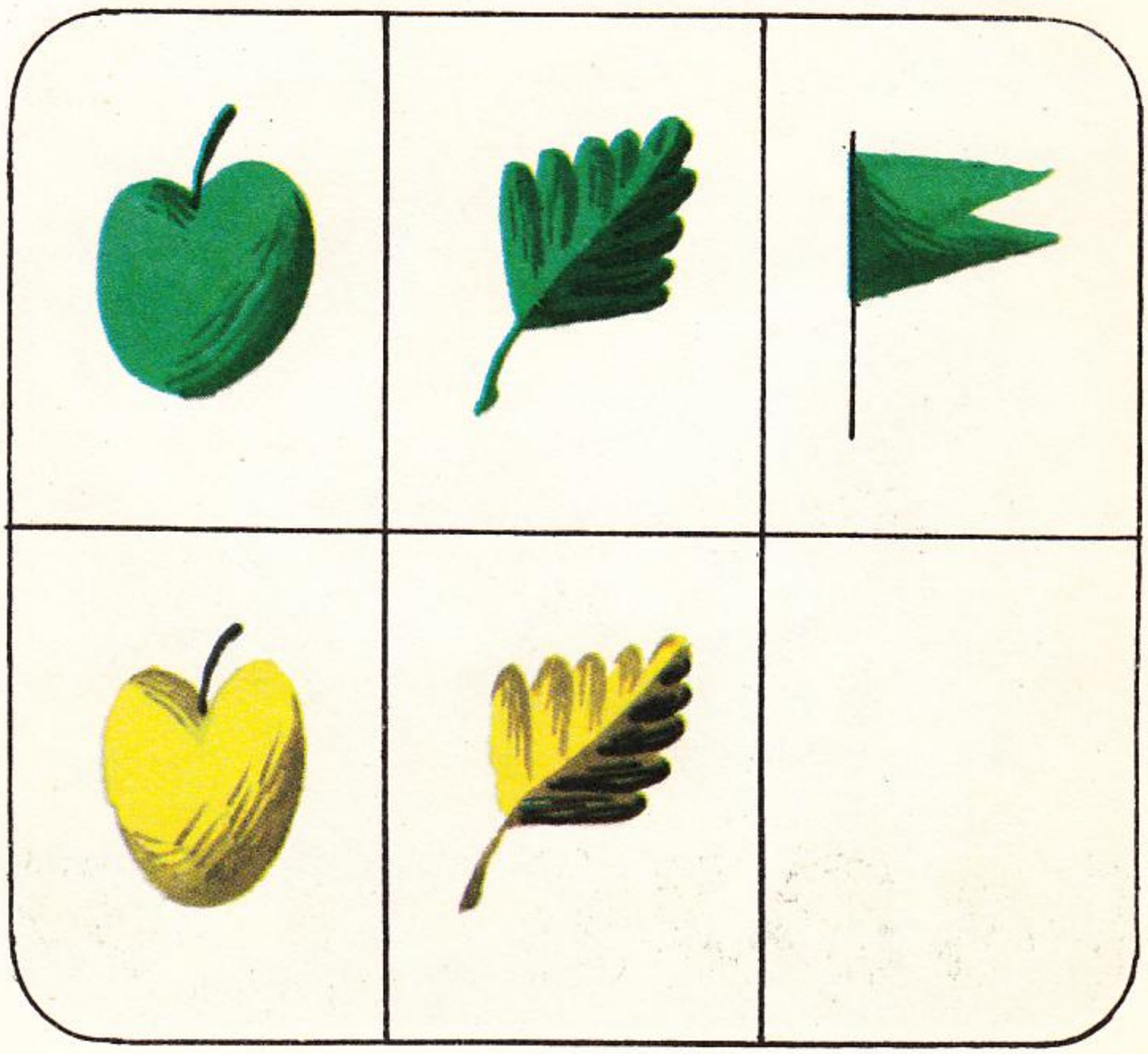
Now try this one. Listen carefully, and take your time. Hare has three sons. Each son has two sisters. How many children has Hare?

LYAPA: I'll do it. I'll take my time. There are three brothers and they have two sisters each. That makes six sisters, and that's nine children in all. Right?

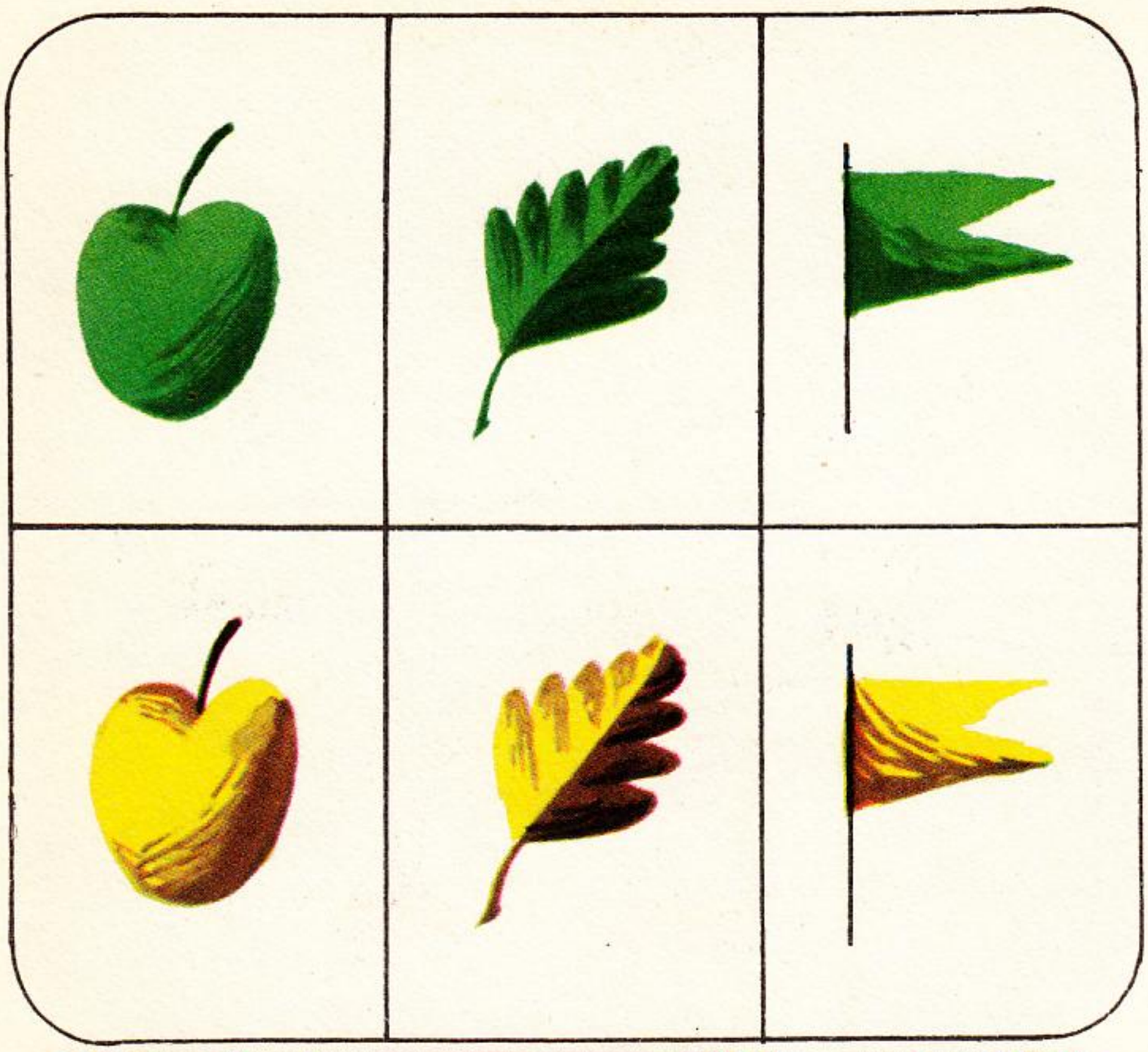


MUMMY: No, it's not right. The sisters are shared between them. So the three baby hares only have two sisters altogether. And the mother hare only has five children.

LYAPA: Yes, I see that now. Give me another problem. I'll do my best not to make a mistake this time.

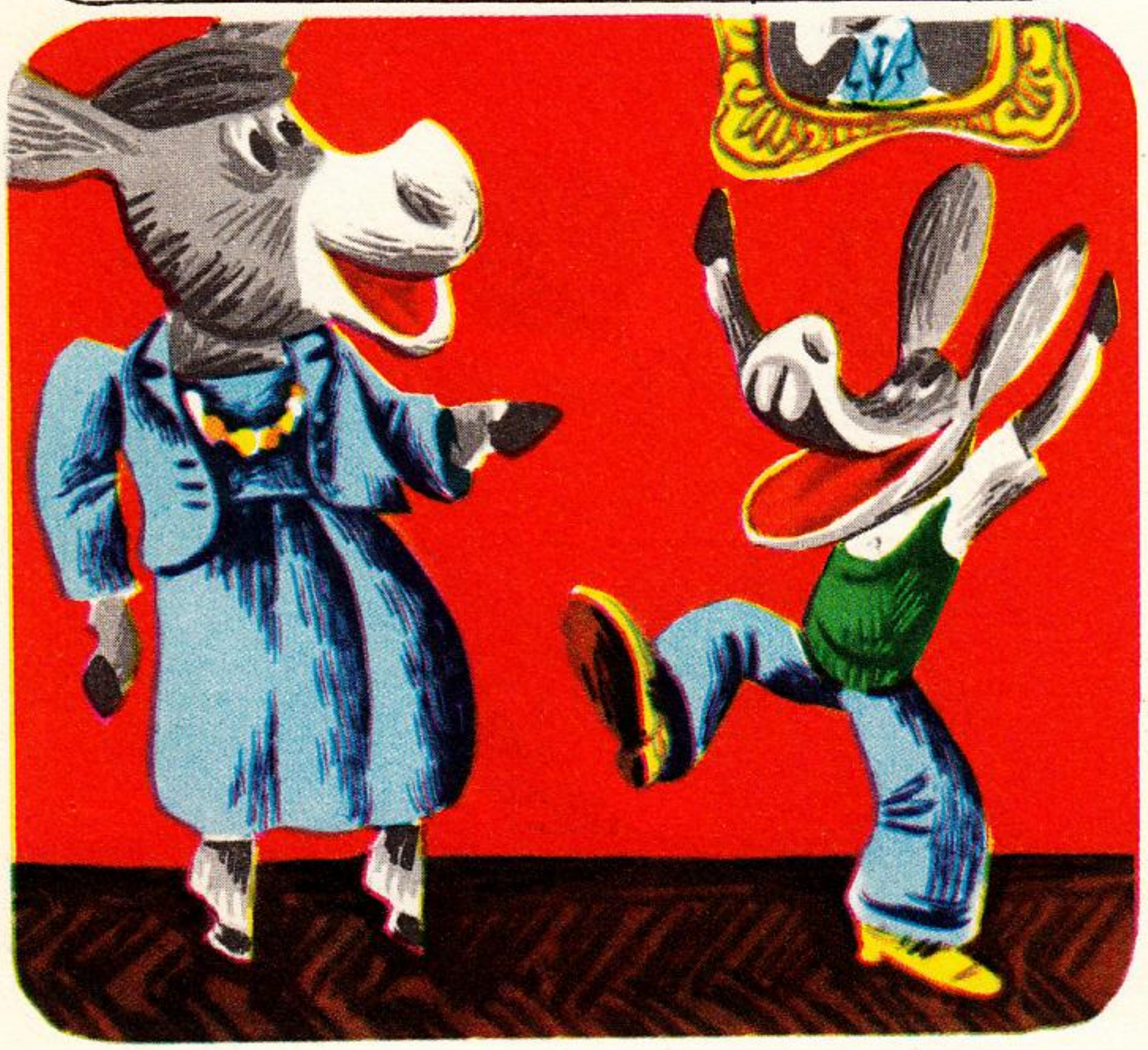


MUMMY: All right then. Look at this picture. One of the five boxes is empty. The others all have different things in them. How can we know how the different things have been arranged in the boxes? And what should we put in the empty one?



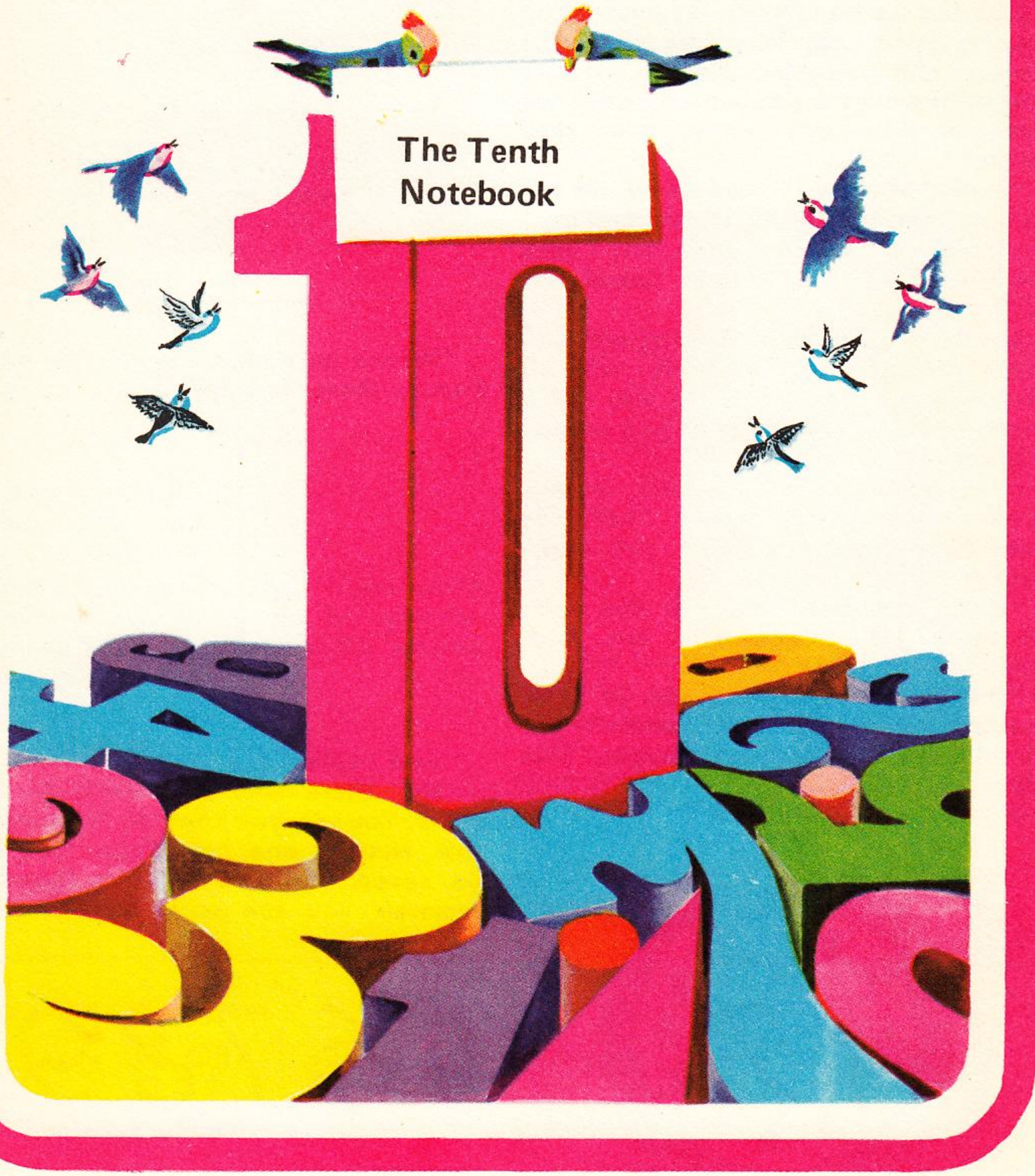
LYAPA: There's a green apple in the picture, and there's a yellow apple. There's a green leaf and a yellow leaf. And there's a green flag. So what goes in the empty box is a yellow flag. Is that right?

MUMMY: Yes, this time you've got it right.



LYAPA: Whoopee! I've learned it! I can do problems now. I don't mix things up any more.

MUMMY: Don't show off, Lyapa. You've only done one problem. You still have a lot to learn.


The Tenth
Notebook

For Daddy, Mummy, Petya and Olya the day began as usual with their morning exercises. Daddy gave the orders. "All right now, line up for the final run. Ready, steady, go!"

Olya led the way, Petya was second and Mummy last. After they had all had a shower and breakfast Daddy said to Petya: "We have a whole hour before we leave for the sports centre. What shall we do!"

"Maths, of course!" said Petya. He got his notebook out. "Why, it's all used up!" he exclaimed. "Please, Daddy, may I have another one. This one's completely full."

Daddy got him a new notebook and Petya put the old one away with his stack of used notebooks. He was rather surprised to see how many he had already finished.

"Yes, you've filled up quite a few, haven't you!" Daddy agreed. "Let's see how many, shall we! Can you count them!"

"Nine," counted Petya. "So this one's the tenth. How d'you write ten, Daddy!"

"There isn't a numeral ten as such. Ten is made up of two numerals you know already, one and nought. Like this.

10

Now write it in your notebook."

You write lots of tens in your notebook too.

"There's no numeral for eleven either, then, is there, Daddy!"

11

"Well guessed! You write eleven with two ones, like this."

"And twelve!"

"No. There isn't a numeral for that either. You see, you know all the numerals now. Nought, one, two, three, four, five, six, seven, eight, nine. Using these ten numerals you can write any number."

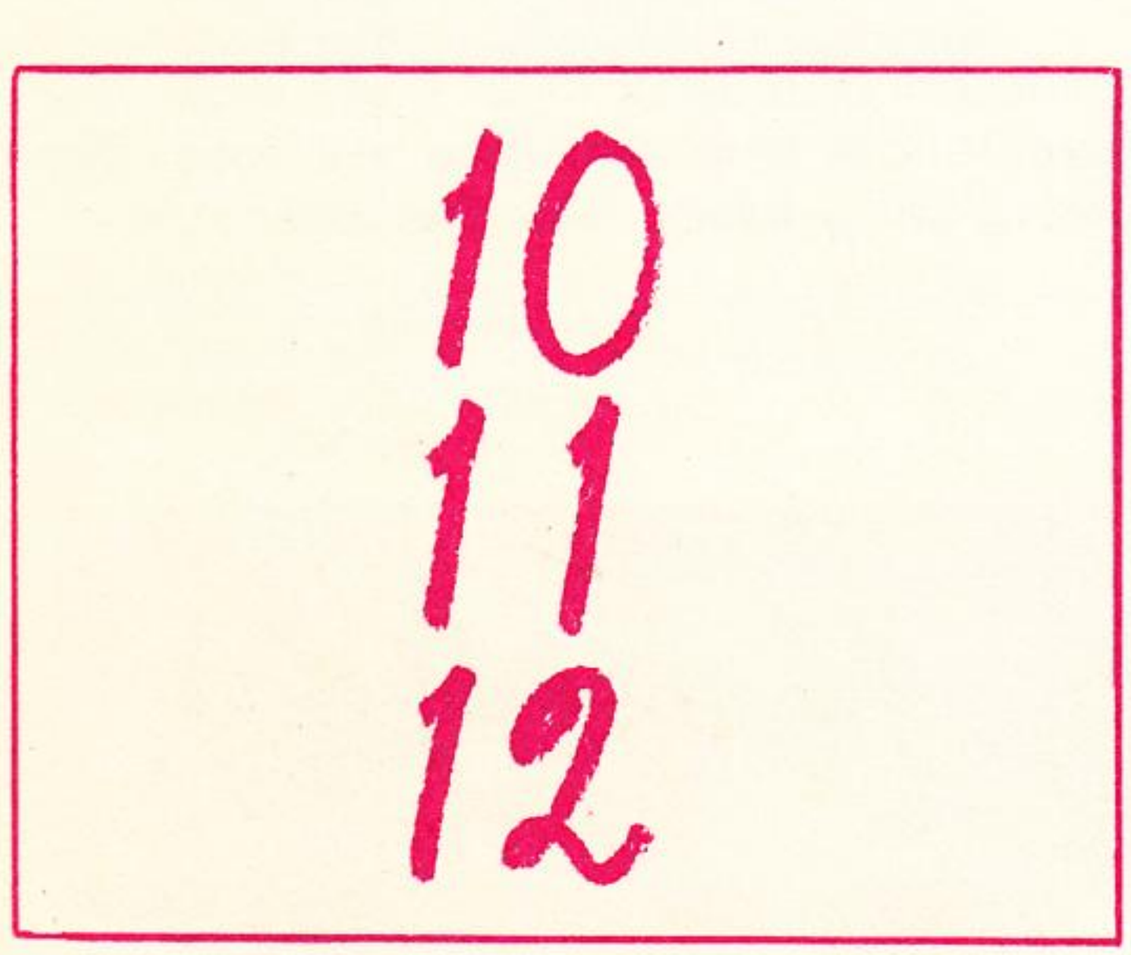
0 1 2 3 4 5 6 7 8 9

Name all the numerals
from nought to nine.
Write number eleven
in your notebook.
Try to guess how
to write a twelve.

"I understand how to write a twelve," said Petya. "First you write a one, and then a two. Right!"



"That's it," said Daddy. "If we write ten, eleven and twelve one beneath the other, we can see that only the second numeral changes."



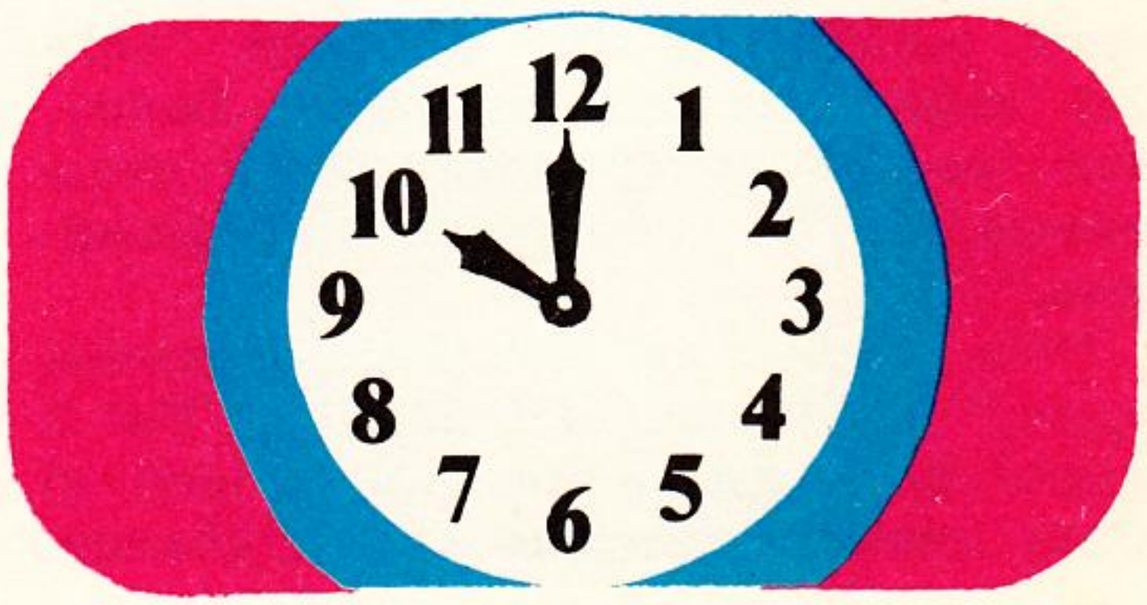
"Then I know how to write the numbers after that too," said Petya impatiently. "One and three, one and four..."

"Stop," interrupted Daddy. "We're not going to write thirteen and fourteen now. It'll be enough to count up to twelve. Then we can count all the months in the year and tell the time."

Can you name all the months
of the year? Look at
a clock with numbers
on it and point to ten,
eleven and twelve.

"What time are we going to the sports centre at?" Petya wanted to know. "I'll look at the clock and tell you."

"We go at ten o'clock. You'll know when it's ten o'clock because the short hand will be pointing to the ten and the long one to the twelve."



When she heard Daddy talking about hands pointing Olya suddenly stopped playing with her dolls, ran up to Petya and Daddy and started jumping up and down. She pointed at Petya and sang. "I'm a hand, I'm a hand! I'm pointing at my brother." Then she turned to Daddy.



"You're a hand too, Daddy. Point at your son."

Daddy stretched his hand out towards Petya and bent at the knees. Petya looked at the two hands, one long and one short, pointing at him, and said, "Let's talk about relationships again, Daddy, like we did at Granny's. We'll draw arrows to show nephews and grandsons."

"We could do those relationships again," Daddy said thoughtfully. "But it would be more interesting to look at some other relationships for a change. And not necessarily relationships between people."

"Are there really relationships between things as well?"

"Of course," smiled Daddy. "We've talked about this sort of thing before. We've looked at comparisons, for instance. A ski is longer than a ski-stick. The pavement is narrower than the road. The lamp-post is taller than the tree."

Do you remember how Daddy and Petya compared things?

"You remember all that, don't you!" Daddy went on. "All those things are related too. You can say a ski is long in relation to a ski-stick. The pavement is narrow in relation to the road. The lamp-post is tall in relation to the tree."

"Can you show those sorts of relationships with arrows too!" Petya asked.

"Of course. Let's show any of these relationships for different pairs. For instance, the relationship 'taller than'. Olya, can you bring us some toys!"

Olya brought a doll, a pyramid and a building-block.



"Have a look at these, Petya, and compare their heights," said Daddy.

"The pyramid is taller than the doll, the pyramid is taller than the building-block," said Olya.

"You haven't compared the building-block with the doll."

"The doll is taller than the building-block."

"Good. And now Petya will show all this on paper with arrows. Where do they go!"

"They'll point to the things that are taller," said Petya.

"That's it. As if each arrow were saying, 'this object is taller than I am.' Now draw them in your notebook."

"May I draw different shapes for all the toys!"

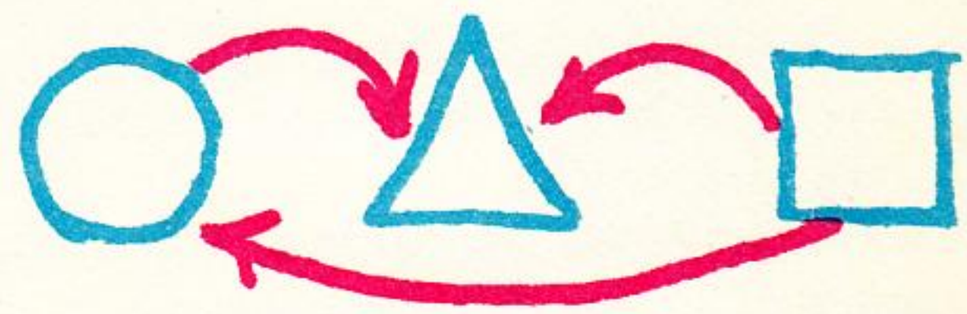
"Yes," nodded Daddy.

"Then I'll put a circle for the doll, a triangle for the pyramid, and a square for the building-block. Like this..."



"Can we have red arrows too!" asked Olya.

"Yes, darling, of course we can." Daddy patted her head.



You compare them too.

Are Petya's arrows right!

"Let's use your drawing to help work out a new problem. Suppose we haven't actually seen Olya's toys. You can imagine that someone's given you the drawing and said the shapes stand for three toys, and the arrows all mean 'taller'. What we have to find out is which of the toys is the tallest and which is the shortest. Can you do it, Petya?"

You work it out too.

Petya ran his finger over the arrows in the drawing and started working it out. "The arrows tell us that the triangle-toy is taller than the circle-toy and the square-toy. So the triangle-toy must be the tallest. Do you understand, Olya?" he added, sounding like Daddy. "Say it all again after me," he went on in the same voice.

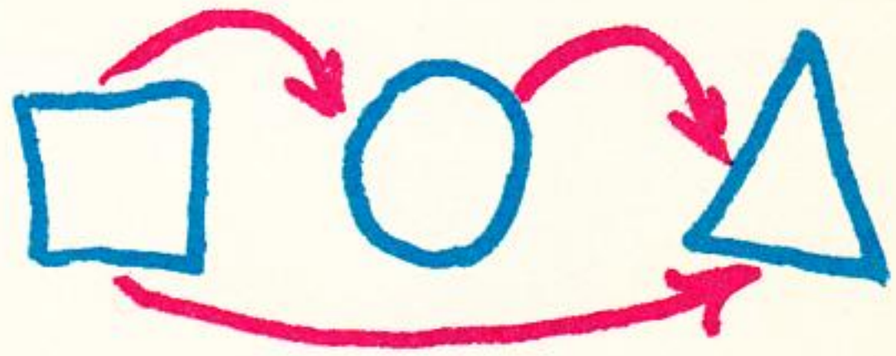
"It's easy," said Olya, pretending to be Petya. "The triangle-toy is the tallest."

Daddy burst out laughing. "Well, all that remains is for me to pretend to be Olya." In a high-pitched voice, he went on, "That's right. Go on, Petya, which is the shortest toy?"

Petya laughed too. Then he said, "The shortest is the one shown with a square. Because the arrows from it are pointing at both the circle and the triangle. That means that they're both taller than the square. That's it, isn't it?"

Is he right?

"We can do something else too," Petya went on. "We can arrange the toys on paper by their heights."



"And we can arrange the real toys by their heights too," said Olya. "We line up by height when we do our morning exercises, don't we?" she added.



"We'll see about that in a moment," said Daddy. "Petya can show us how tall or short we are in relation to each other."

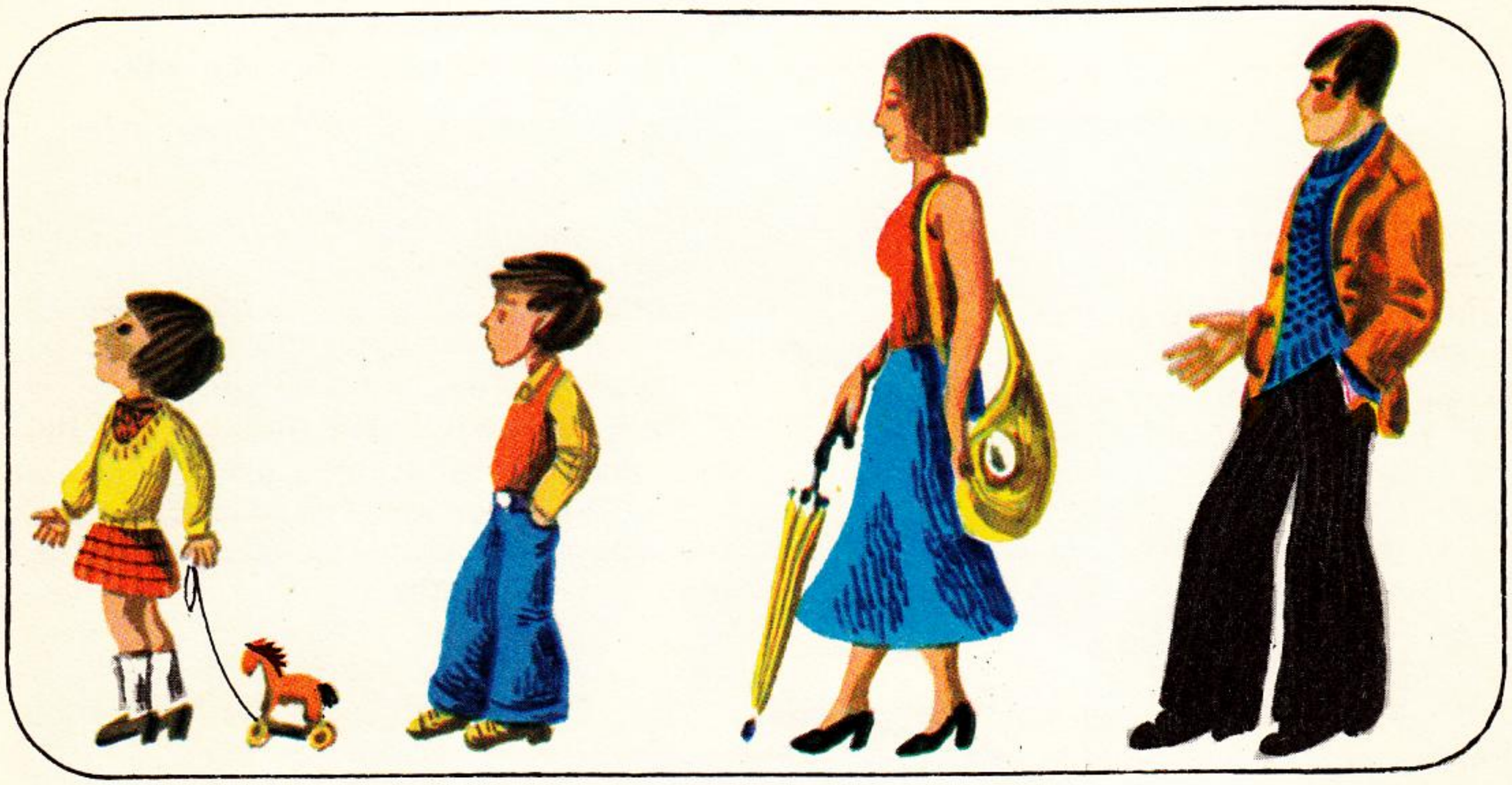
Petya was delighted to have another problem to do. He quickly drew two squares and two triangles in his notebook. The squares stood for Daddy and Petya and the triangles for Mummy and Olya. Now he had to draw the arrows.

"Mummy!" he called, "come here!" Mummy came into the room and immediately Petya cried, sounding just like Daddy, "Line up for the final run!"

"I had a reason for saying 'line up'," Petya explained. "We're doing maths exercises, not morning exercises. I have to work out our heights in relation to each other."

"Oh, I see," said Mummy smiling. "There's always time for maths exercises. Let's line up then, shall we!"

"Now we can see," cried Petya. "I'm taller than Olya, Mummy's taller than me and Daddy's taller than Mummy. You can go now. I have to draw my arrows."



"Exercises again!" asked Mummy in surprise. "Surely we've had enough for today! We're leaving for the sports centre shortly."

Look at the picture and say whether Petya is right.

Daddy stopped him. "Take your time, Petya. You're ahead of yourself. Look at Mummy and me more closely."

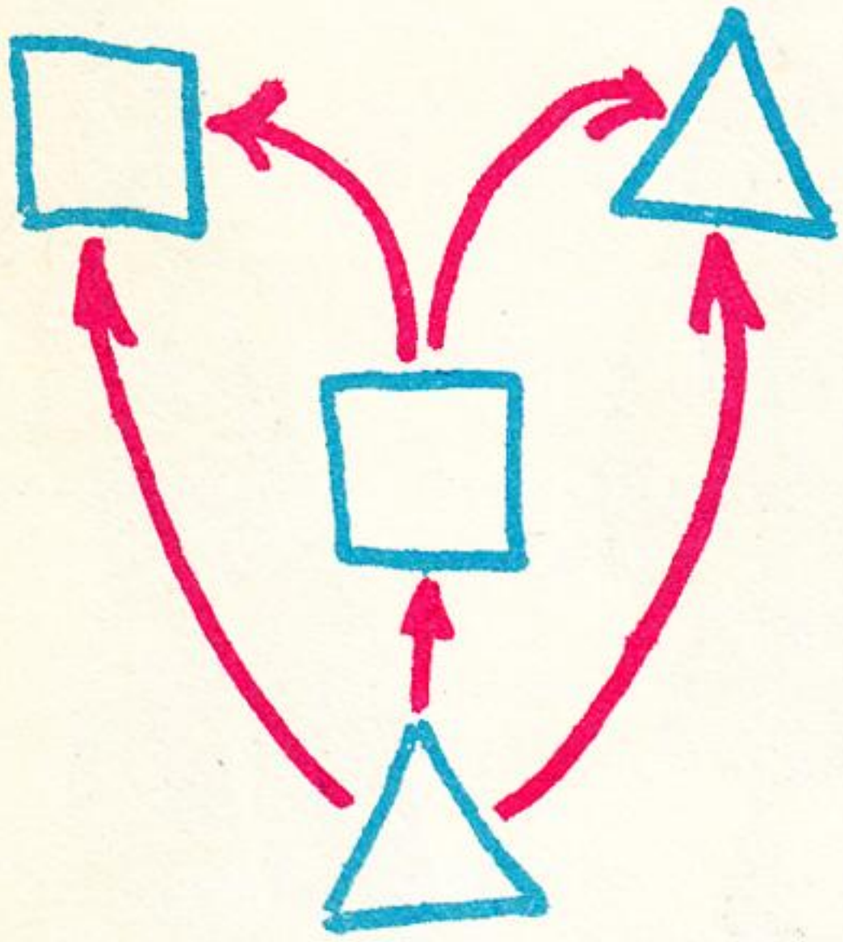
"Oh! I'm wrong. Daddy isn't taller than Mummy. Neither of you is taller."

"We're the same height. When we do our morning exercises we can change places with each other."

"But where do the arrows go?" Petya asked.

"Think about it."

"Oh, I see. There shouldn't be an arrow from Daddy to Mummy, or from Mummy to Daddy. Here's how the drawing should be."



Has Petya shown the relative heights of the people in the family correctly?

"That's it," said Daddy. "And now we should be off. It's ten o'clock."

And they all set off for the sports centre. First they went to the swimming pool. Petya and Olya and some other children were having swimming lessons. The coach showed them how to move their arms and legs in the water. Petya was already able to swim a short distance but Olya couldn't swim at all yet without help. After the lesson, Daddy, Mummy, Petya and Olya watched the divers. When they had left the swimming pool, Olya asked, "Can you dive, Daddy?"

"Yes. Though I've never tried to dive from a high diving board like that. I used to dive from a lower one."

"And did you learn to swim when you were little?" Petya asked.

"Yes."

"In this swimming pool?"

"No, not this one. It didn't exist when I was a boy. It was only built quite recently. It's younger than you are, in fact."

"How long has it been here?"

"Tell you what," said Daddy, "I'll give you another question instead of an answer. Here you are. The pool is younger than you but older than Olya. How old does that make it?"

Try to answer Daddy's question. Remember that Petya is six and Olya is four.

Petya started working it out. "I'm six," he said. "And Olya's four. So the swimming pool was built less than six but more than four years ago. What number is smaller than six but bigger than four!"

Answer Petya's question.

"Five," said Petya. "It's been here for five years. Did I do it right!"

Daddy nodded.

"How do we write it!" Petya asked him.

"Well, since we don't know how old the pool is, we should use a little square to show the unknown number, remember! The unknown number is small in relation to six...."

"But four is small in relation to the unknown number!" Petya completed. "We can start drawing arrows. Let's write it all down. But we haven't got anything to write on!" he cried in dismay.

"Ask Olya for a piece of her chalk and we'll write it on the pavement," Daddy suggested.

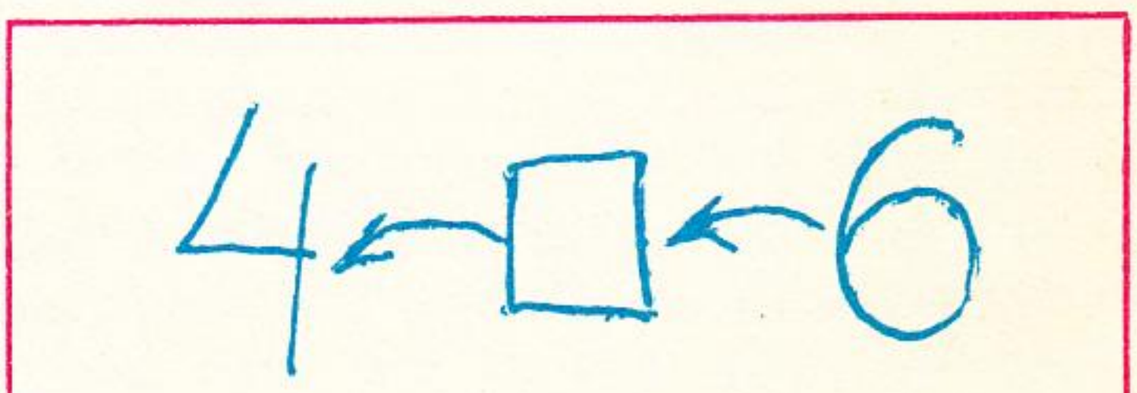
"No," said Mummy. "Let Olya keep her chalk and go on drawing little people. Here's my pad. You can use that."

"But I haven't got a red pencil," said Petya.

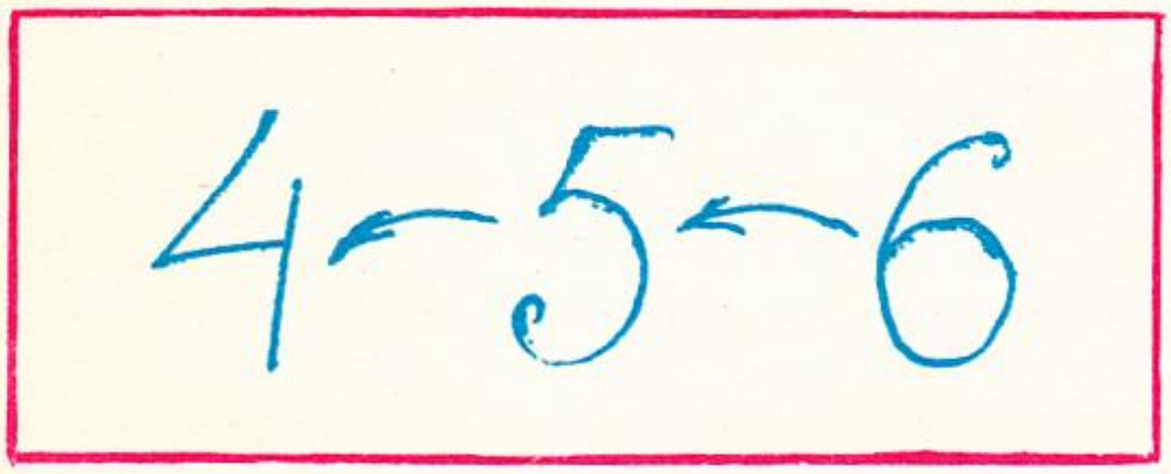
"Use my pen," said Mummy.

"I've done it now.

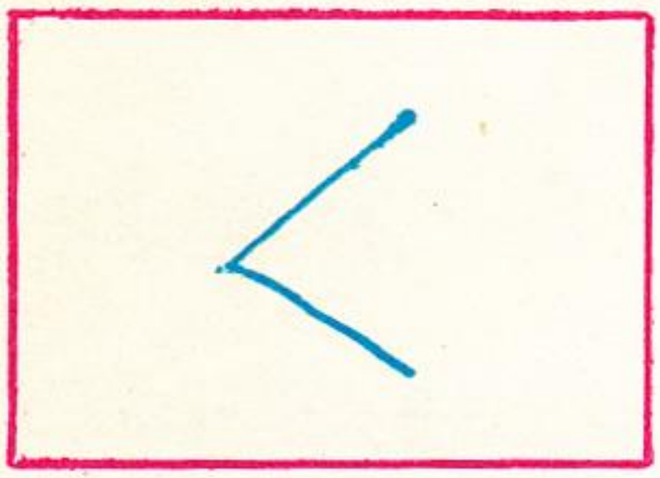




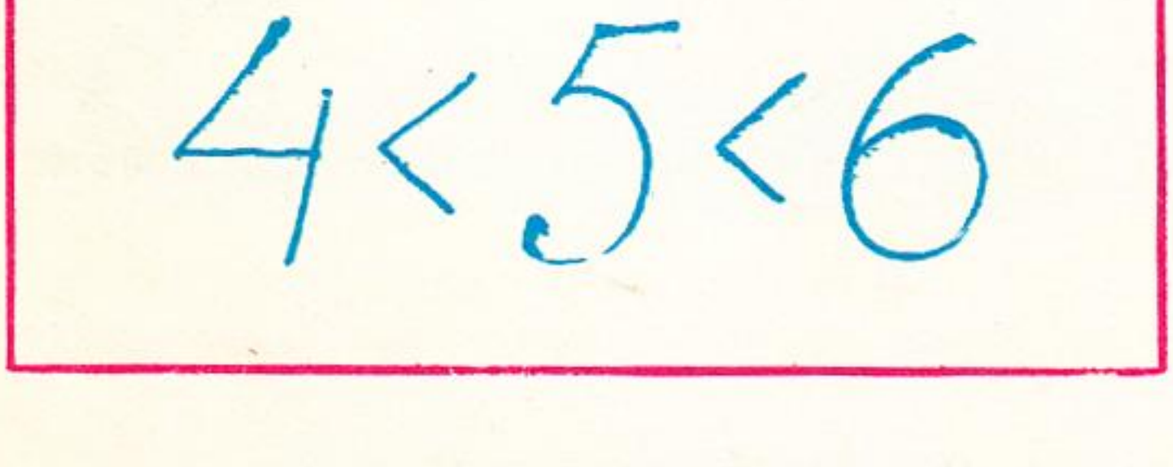
Each arrow says, 'this number is smaller.' And now we write a five instead of the little square. Right!"



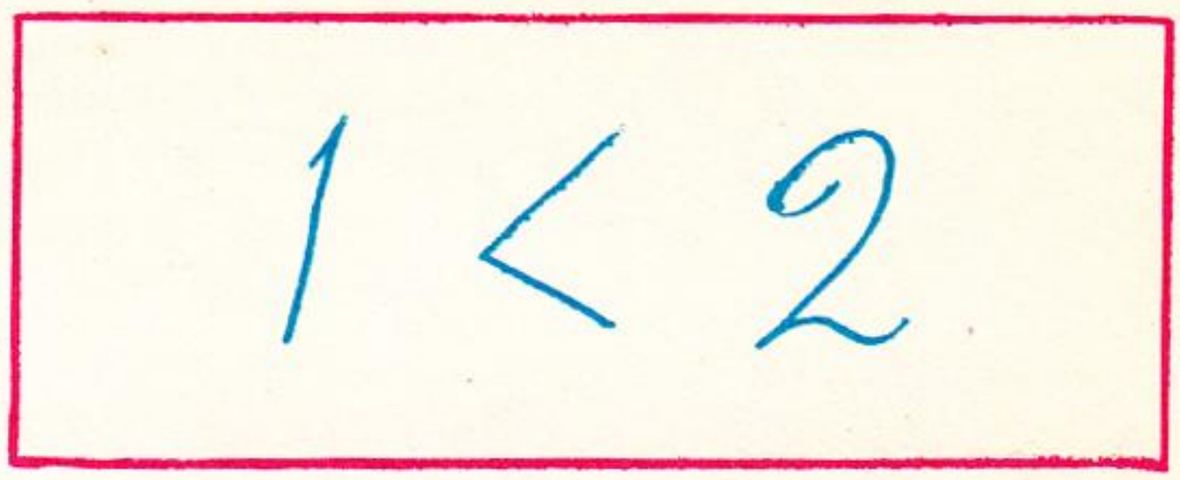
"Yes," said Daddy. "You can write it like that. But there's special sign in maths to show the relationship 'smaller than' between numbers. Look.

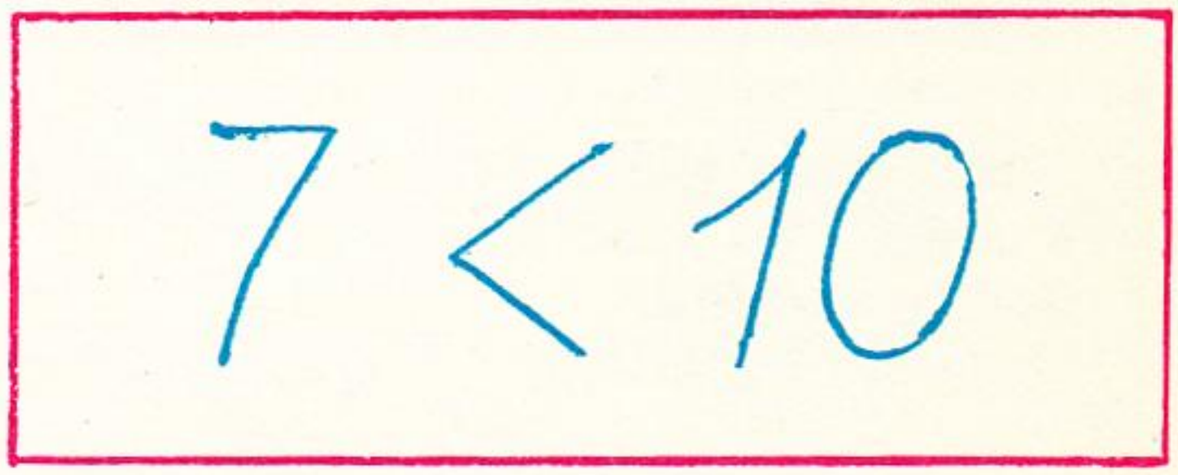


You can write it like this.



It's as if the shafts of the arrows had been taken away and only the heads are left. The sharp end of the head points to the smaller number. For instance:





Here are some patterns for you to read."

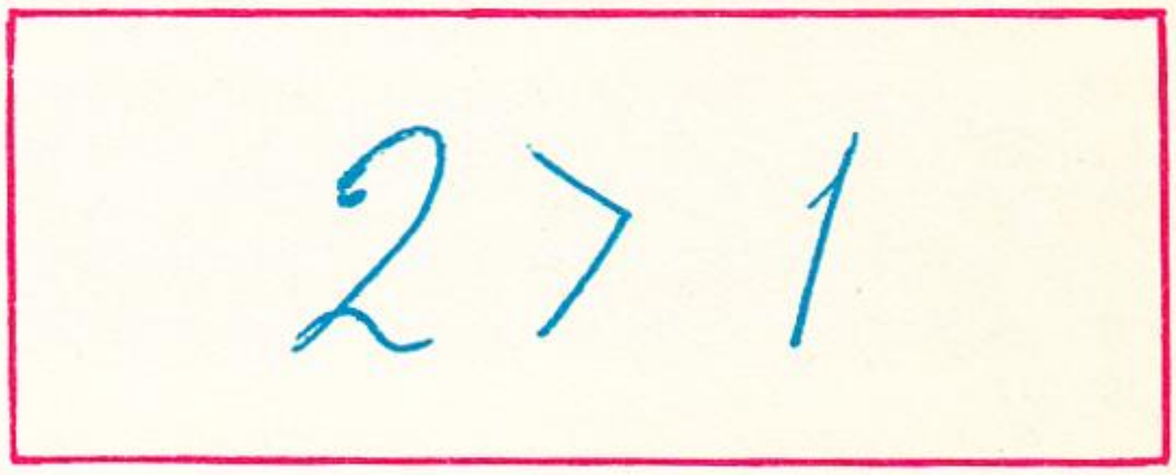
**Read these patterns.
Give some examples
in which one number
is smaller than the other.
Write them in your notebook
using the "less than" sign.**

Petya read what Daddy had written. "One is less than two. Seven is less than ten."

"That's right."

"But, Daddy, you can say two is bigger than one and ten is bigger than seven as well, can't you!"

"That's right. And when you want to write it, you do it like this."



10 > 7

"But that's a different sign!" cried Petya. "Bigger than..."

"That's it," Daddy nodded. "Remember these new signs. 'Bigger than' and 'smaller than'. Each of them points with its sharp end to the smaller number."

"And the things like wings ... do they point to the bigger number?" Petya asked.

Olya stopped drawing with chalk on the pavement and ran up to them. "Wings?" she asked. "Have you caught a butterfly?"

"Two," said Petya. He covered the pad with his hand and opened his eyes wide. "They'll come out and spread their wings."

Olya clapped her hands.

"Don't tease, Petya," said Daddy. "I'm afraid Petya's butterflies are just mathematical signs, Olya," he told her. "But they do look quite like wings, and they point to the bigger of the two numbers. I'll show you what I mean. Tell me how old you are, Olya."

"Four," said Olya.

"And do you know how old Petya is?"

"Six."

"And which is bigger, six or four?"

"Six."

"Good. Now, Petya's going to write it for us. Using the right sign, with the wings pointing in the right direction."

Here's what Petya wrote.

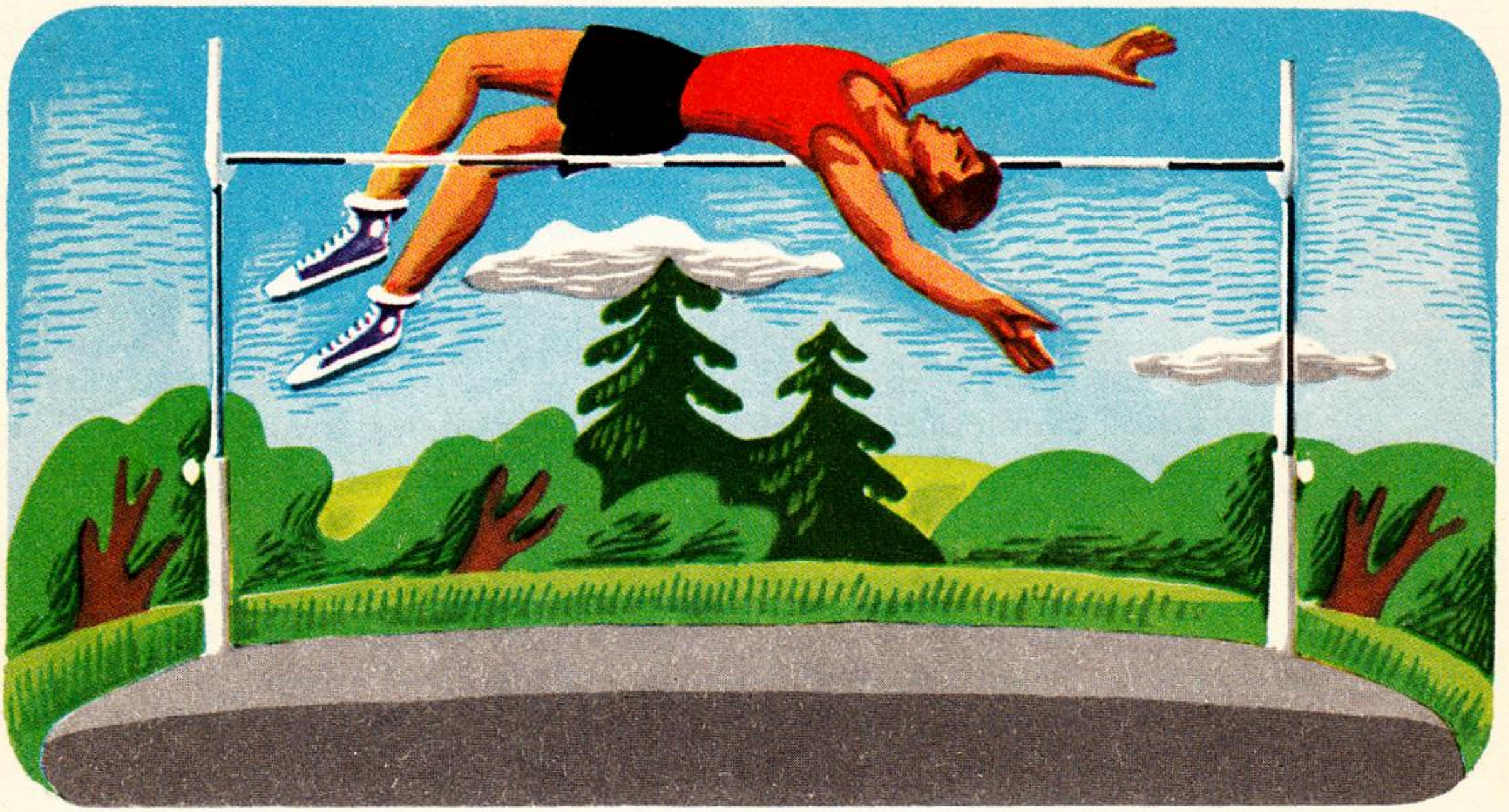
6 7 4

Is it right?
Think of other examples where one number is bigger than another. Write them down in your notebook using the sign "bigger than".

"We've been sitting in one place quite long enough," said Mummy. "There's something interesting happening in the high-jump section. Let's go and see."

Daddy, Mummy, Petya and Olya went to see the high-jumping.

The bar was very high. One of the athletes ran up to the jump, leapt and flew over it.



"Hurrah!" Olya clapped her hands.

"Splendid! See how high he jumped!" cried Petya.

"Shall we see exactly how high it is?" Daddy asked. He went up to the high-jumpers.

"Why does he want to know the exact height?" Petya wondered. "It's obvious it's very high."

"Of course it's obvious the jump is high," Mummy agreed. "But if the bar were a bit higher or a bit lower it would still be high. Then how would you tell the difference between one height and the other? That's why they always have to measure."

"What does measure mean?"

"It means to show how big something is, or how much of it there is, with a number. For instance, when I go shopping I don't tell the shop-assistant to give me lots of milk or a little sugar. I say it much more exactly. 'I'll have three pints of milk', or 'May I have a pound of sugar?'. Then the shop-assistant measures the amount."

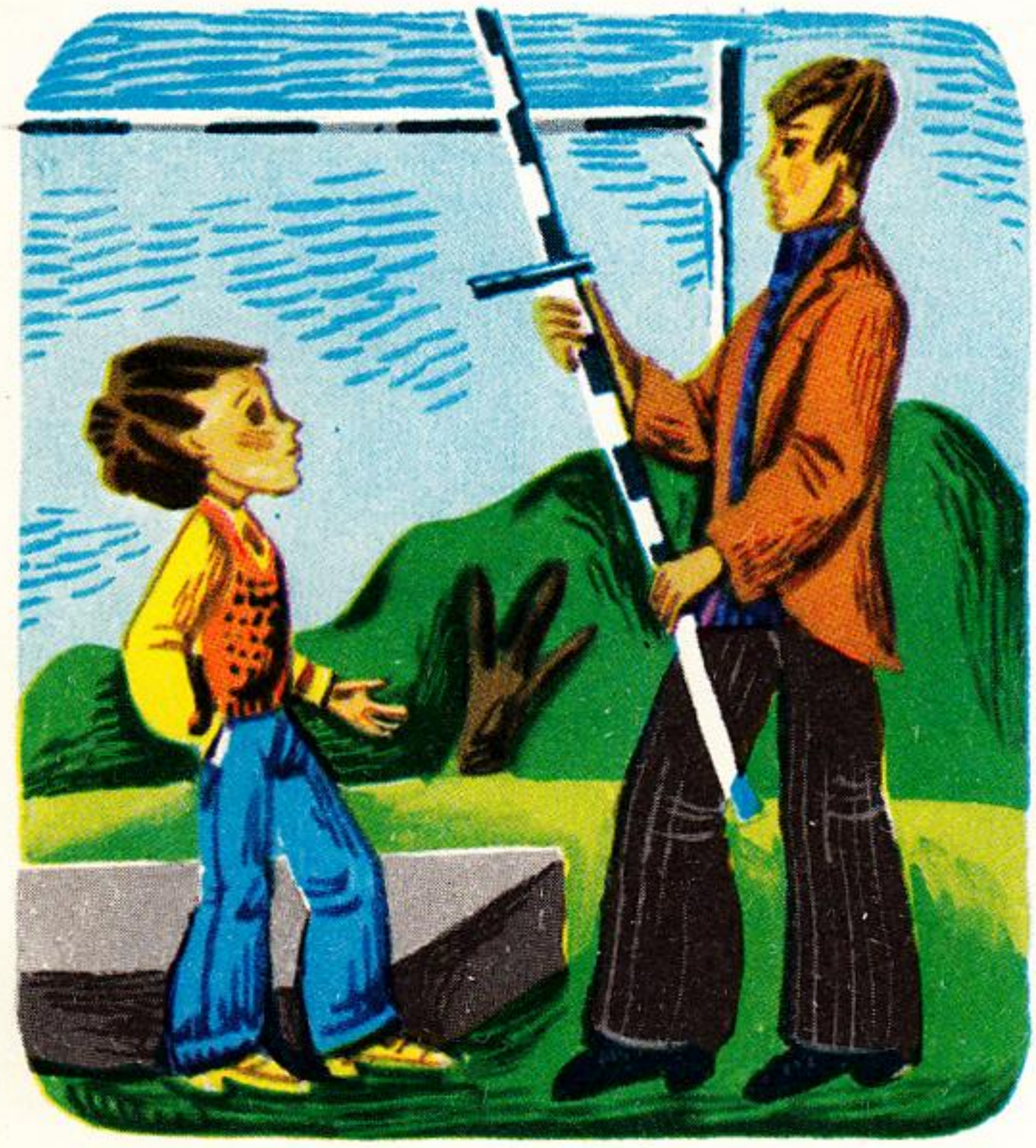
"I see. Pints for milk, pounds for sugar. What do you say for height?"

Just then Daddy came back. "It was a very good jump. Seven feet."

"There's the answer to your question, Petya. Height is measured in feet. And so is length. And so is width."

"How much is a foot?"

"I'll show you," said Daddy. "They measure the height of the bar with this yard-rule. It's exactly a yard long — three feet."



Do you know how long
a yard is?
Ask someone
to show you.

"Do let's measure things," said Olya.

"All right," Daddy agreed. "We'll measure your heights. A yard-rule like this is especially useful for that. We'll begin with Petya, then we'll measure Olya. Come here, Petya. That's it. I'll mark your height on the ruler. Look."

Petya saw that he was more than three feet tall.

"But what are we to do! We can't just say 'more than three feet'. We have to measure exactly."

"Yes," Daddy agreed. "We'll have to divide the feet into parts. You can divide a foot into twelve equal parts."

"What are the parts called!"

"Inches. Remember, one foot has twelve inches in it."

Try to
remember
that one
foot has twelve
inches in it.

"You know, son," Daddy said. "Many countries use the metric system. Thus, they measure length and height in metres and centimetres. It makes counting quite easy. For instance, there are one hundred centimetres in a metre. Ten centimetres make a decimetre. Ten decimetres make a metre. Depending on the system you use, you can express height either in centimetres or in feet and inches."

How tall is Petya
if you express his
height in inches?

Peter's height expressed in decimetres is twelve, or ten decimetres (one metre) and two decimetres (twenty centimetres).

10+2=12

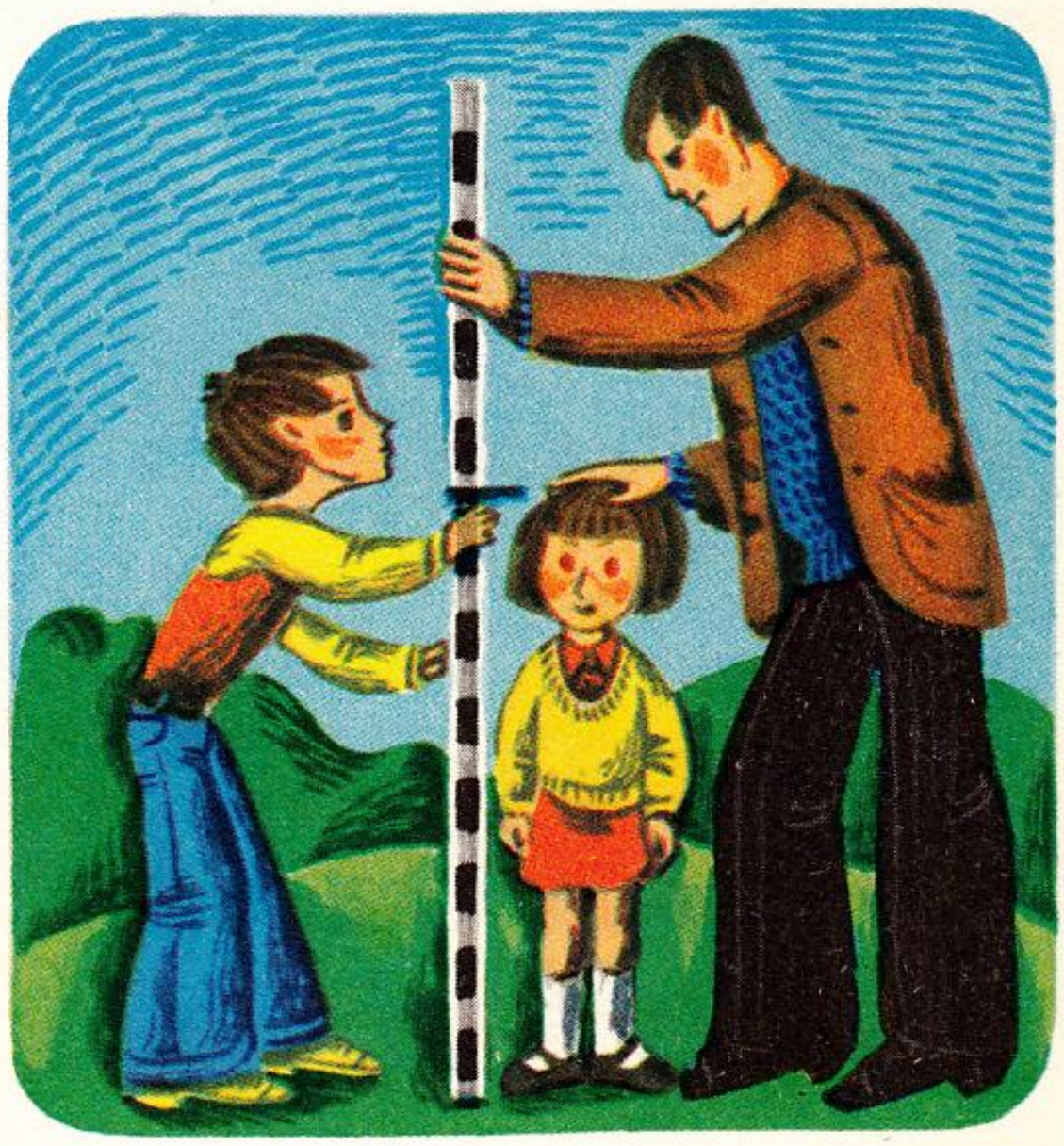
"Look at the ruler," Daddy went on. "The longer lines show the feet."

"But there are lots of shorter lines too," said Petya. "What do they show?"

"Inches, of course. Now, let's finish measuring your height. From the three-foot mark, you measure five more inches. So if you want to say exactly what height you are, you say three foot five inches."

"It's my turn now, Daddy," said Olya.

"All right. We'll measure Olya. Or rather, Petya will."





Remember that one decimetre has ten centimetres in it.

"Olya isn't even three foot," said Petya. "She's two foot and eleven inches."

"Now can we measure Mummy and

Daddy's height!" asked Olya.

"Not now. When we get home, you and Petya will be free to measure anything you like. At home we have both an ordinary twelve-inch ruler and a tape-measure for dress-making."

"How long is a tape-measure!" Petya asked. "Is it enough to measure Daddy!"

"No, it's only three feet. You'd need the better part of two tape-measures to measure Daddy."

"And then we'll use two tape-measures to measure you, Mummy."

"But, Olya," said Mummy, "we won't have to measure me, because I'm the same height as Daddy."

"What else is there to do at the sports centre!" Petya asked.

"It's hard to choose, there's so much to do. We can watch competitions. Or training sessions. Or even do some exercises ourselves."



Have you got a ruler or a measuring-tape with inches on it at home? Measure the lengths, heights and widths of different things: table, chair, fridge, sofa and so on.

EXERCISES  EXERCISES

1. What is this number!

9

2. What do these signs mean!

< >

What are these numbers!

10 11 12

4+5=
8+3=
12−3=
10−8=.

5×2=
2×6=
9÷3=
12÷3=

6+□=10
□+5=12
9−□=1
□−2=9

3×□=9
□×4=12
10÷□=5
□÷6=2

EXERCISES EXERCISES



5. A postcard cost 4 pence. Tolya paid 10 pence and asked the shop-assistant for one postcard. How many pence will he get back in change? How many cards can he buy for 12 pence?

6. Oleg woke up at eight o'clock. "Haven't I overslept, Mummy?" he asked. "Is it time for us to leave for the puppet show?" "It's still early," Mummy said. "The puppet-show starts in three hours' time." "When are we leaving?" "We'll leave the house an hour before the show begins." When does the show begin? When will Oleg and Mummy leave home?

7. Some guests were invited to a house-warming. They arrived in three cars, four people in each. How many guests came to the house-warming? Do the sum and write down the answer.

8. At the greengrocer's they sell potatoes in five-pound packs. How many packs make ten pounds?

9. Lena lives on the fourth floor. When she comes in, it takes her half a minute to get from one floor to the next. How long does it take her to climb the stairs to her flat?

EXERCISES EXERCISES



10. Fill in the blanks between these numbers with the correct signs: > or <.

5....7 12....4 6....1

10....11 9....2 3....8

11. Look at this pattern:

$$2 < \square < 6$$

If we replace the little square with

$$2 < 3 < 6$$

a three, the relationship between the numbers will still be shown correctly. The numbers 4 and 5 would also work. However, neither 1 nor 8 will do, as 1 isn't more than 2 and 8 isn't less than 6. So in our pattern the set of suitable numbers is 3, 4 and 5. Now find the sets of suitable numbers for each of these.

$$9 < \square < 11$$

$$3 < \square < 8$$

$$6 < \square < 7$$

Isn't one set empty?

12. Look. The numbers 1, 2 and 3

1 2 3

are arranged in rising order. Each one is bigger than the one before it. In this pattern, however,

1 3 2

the order is mixed up. 3 is bigger than 2 yet it has been placed before it. How mixed up is the order of the following numbers?

3 6 5 4

Look. 6 is bigger than 5 yet it has been placed before it. So one number is out of order. Let's look again. 6 is bigger than 4 and yet it has been placed before 4. 5 is also bigger than 4 and has been placed before it. So there are three numbers out of order altogether.

EXERCISES EXERCISES

Now look at this: There are two numbers out of order.

4 6 5 8 7

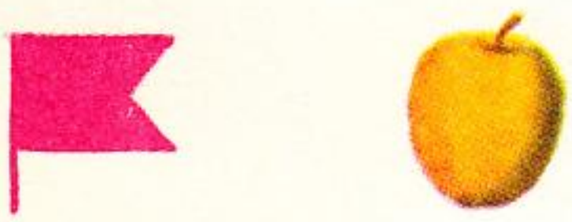
Find them.

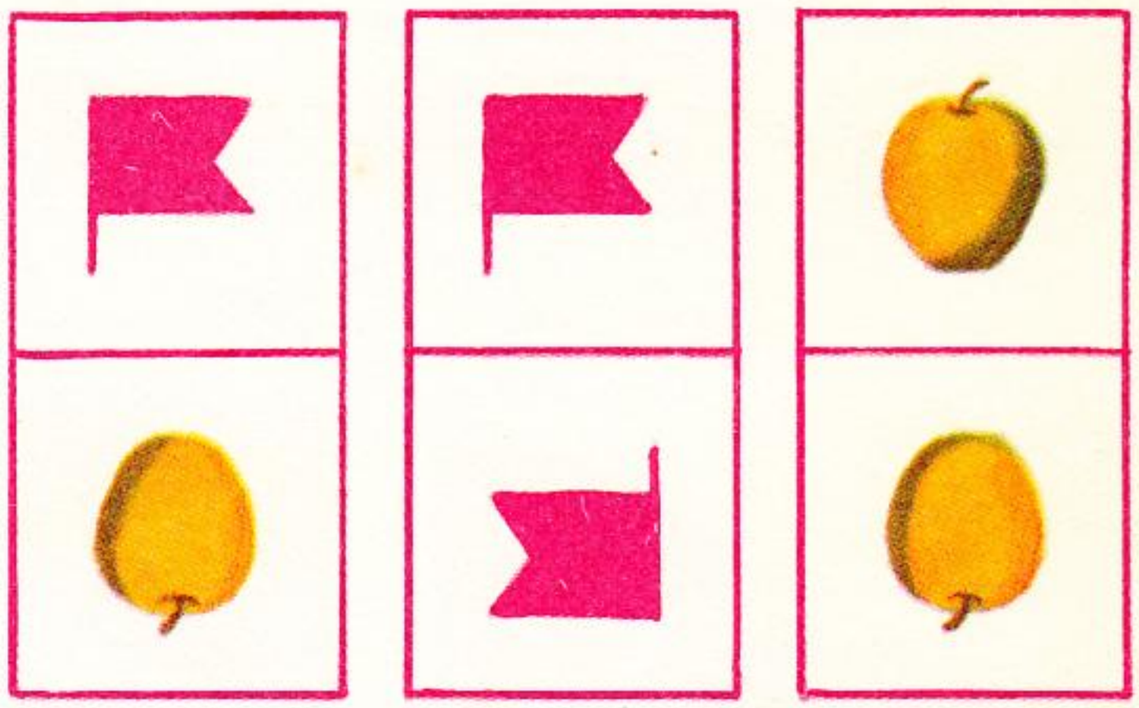
While here there are four numbers out of order.

4 5 2 3

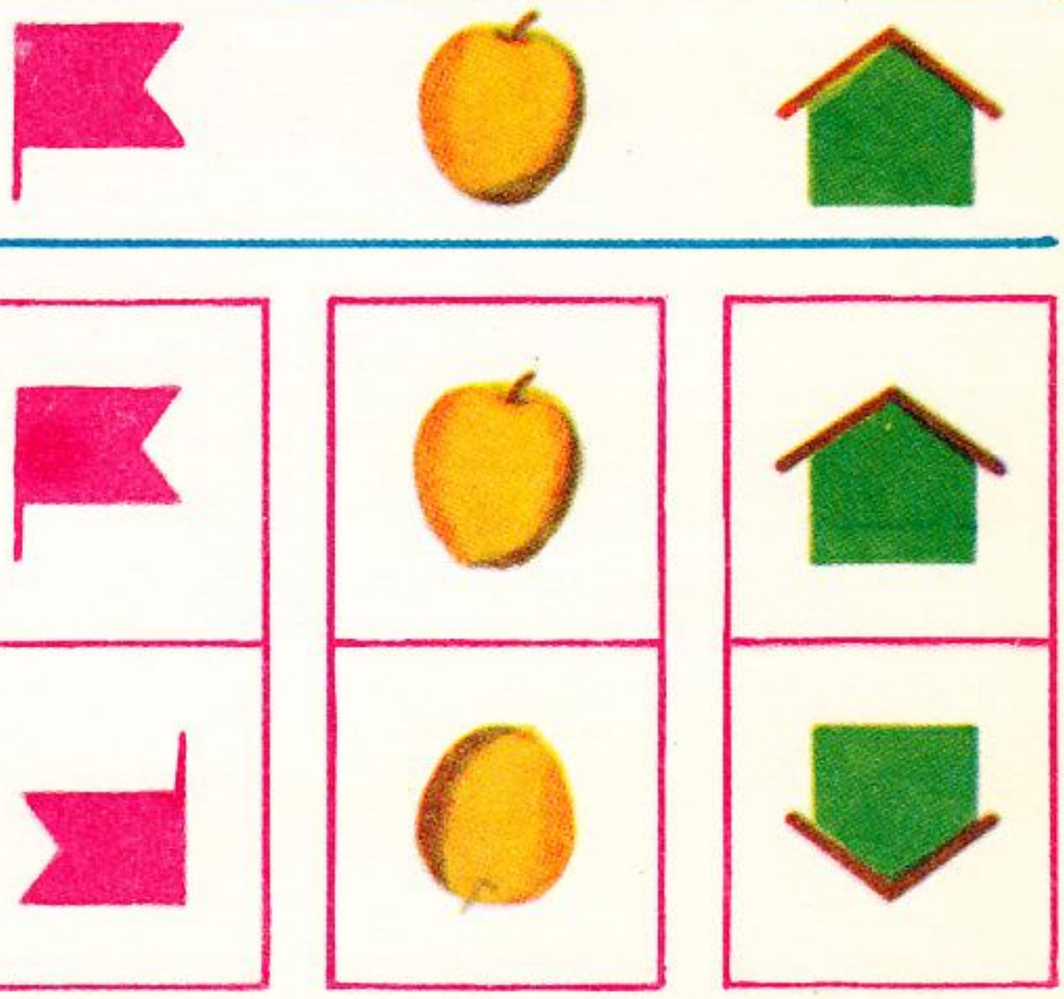
Find them.

13. With two pictures like those below you can make three dominoes. Look at them.





But with three pictures you can make six dominoes.

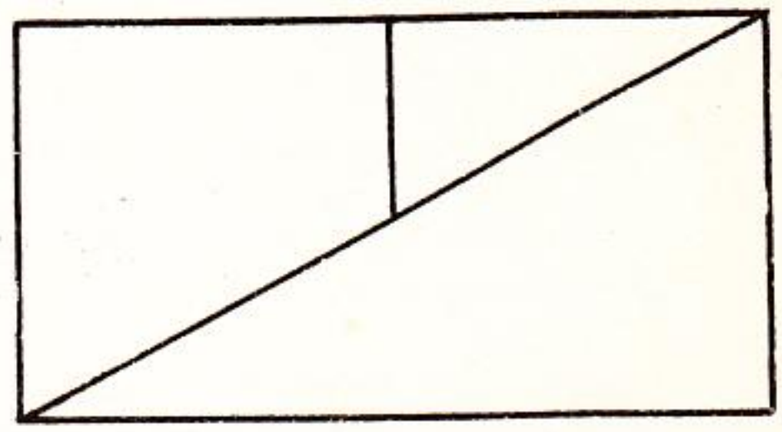


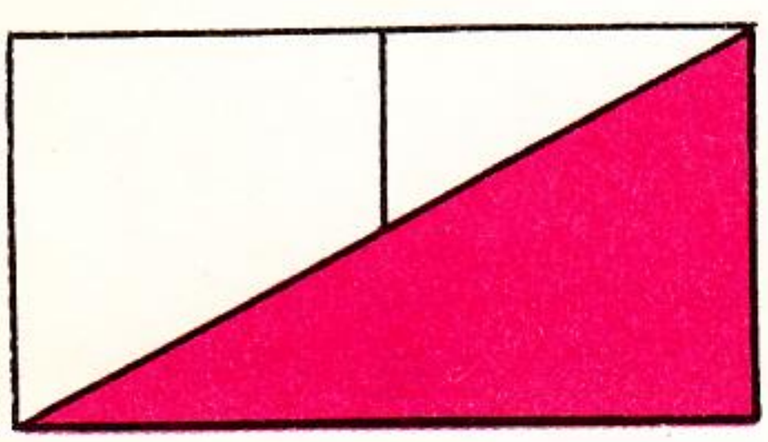
EXERCISES EXERCISES

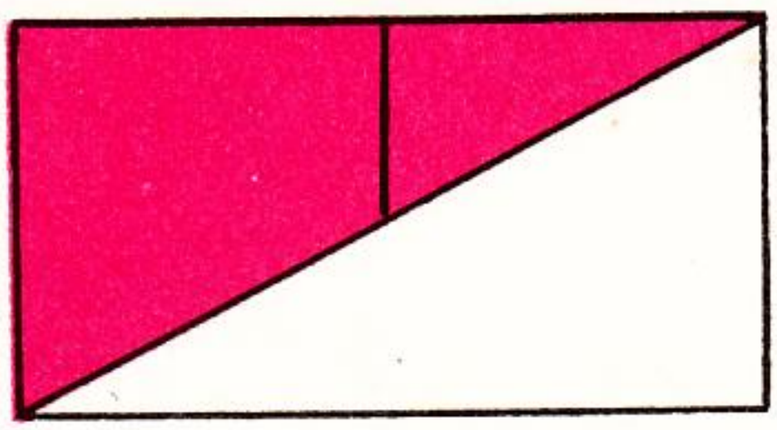
With four pictures you can make ten dominoes. Try to draw them.

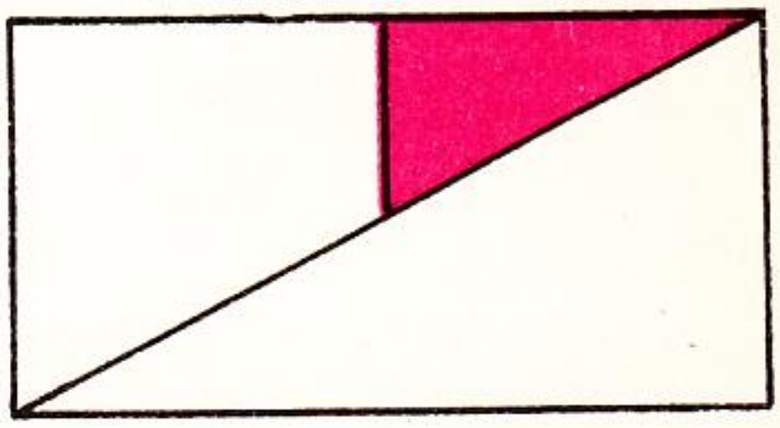


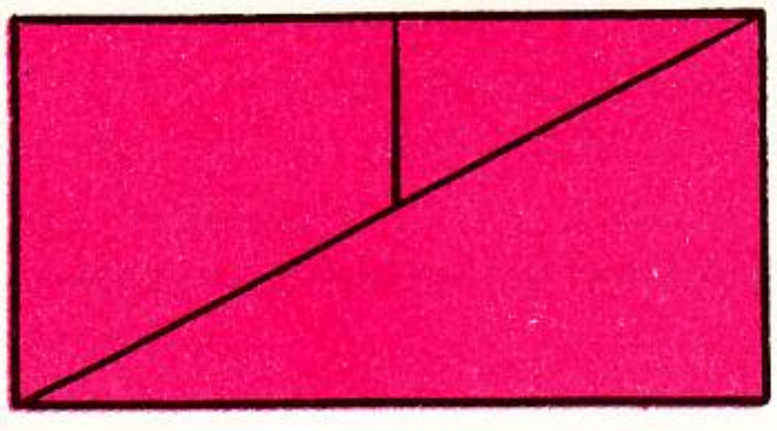
14. There are three triangles and two quadrilaterals in the drawing. Each of these shapes has been coloured differently in the pictures below.

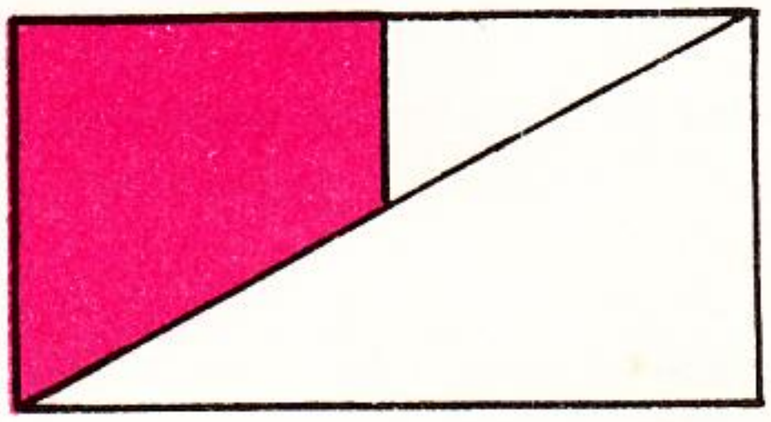




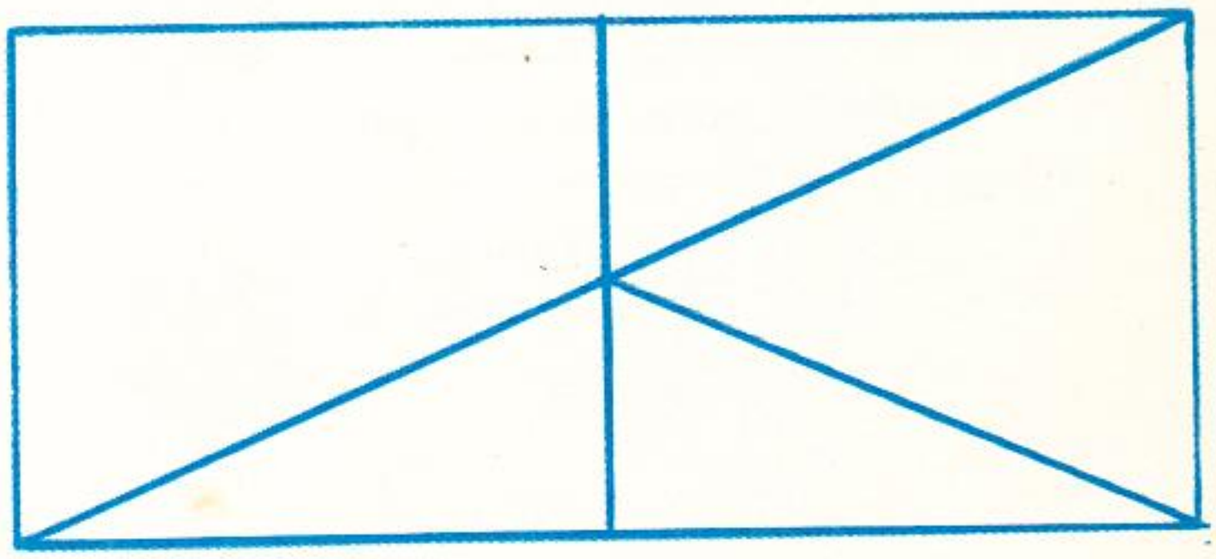








Seven triangles and six quadrilaterals are hidden here. Try to find them all.



EXERCISES EXERCISES



15. Look at this pattern. What number goes in the empty box?

1	3	5	7	9	

And in this pattern?

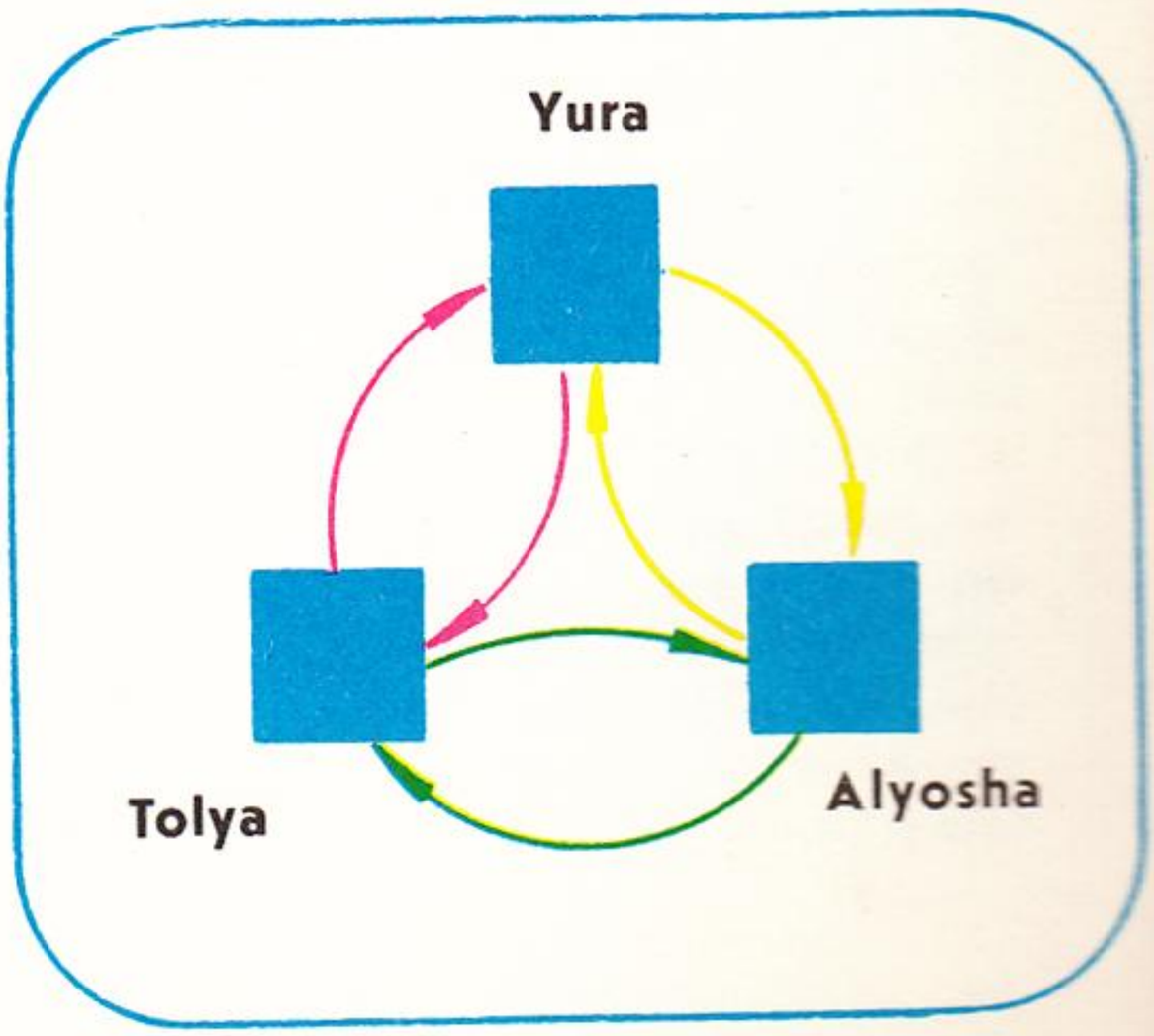
2	4	6		10	12

16. Notice the order in which these shapes have been arranged. What shapes should go in the empty boxes in the second row?



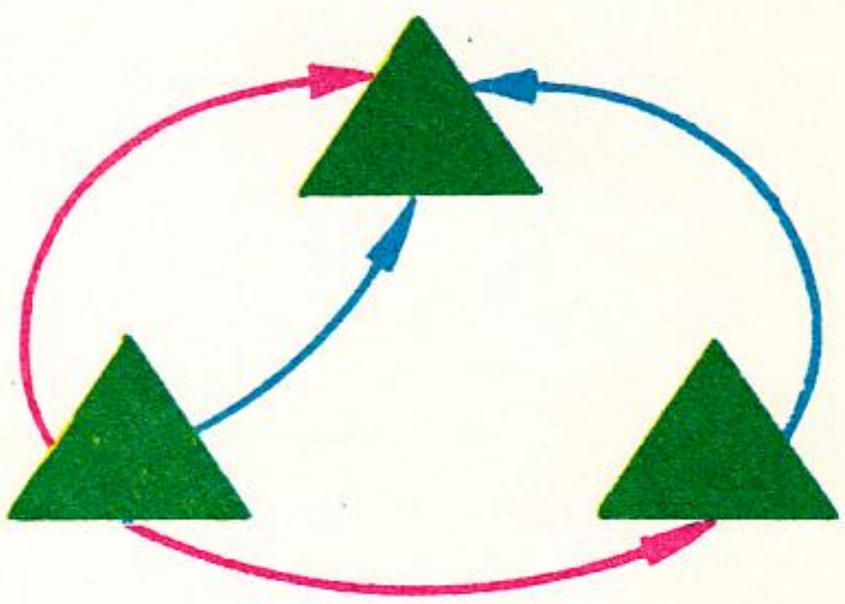


17. Tolya and Yura live in the same house. Yura and Alyosha go to the same kindergarten. Alyosha and Tolya skate at the same club. The relationships between the boys are shown in the drawing with different-coloured arrows. The red arrow says, "he and I live in the same house." What does the yellow arrow say? And the green one?

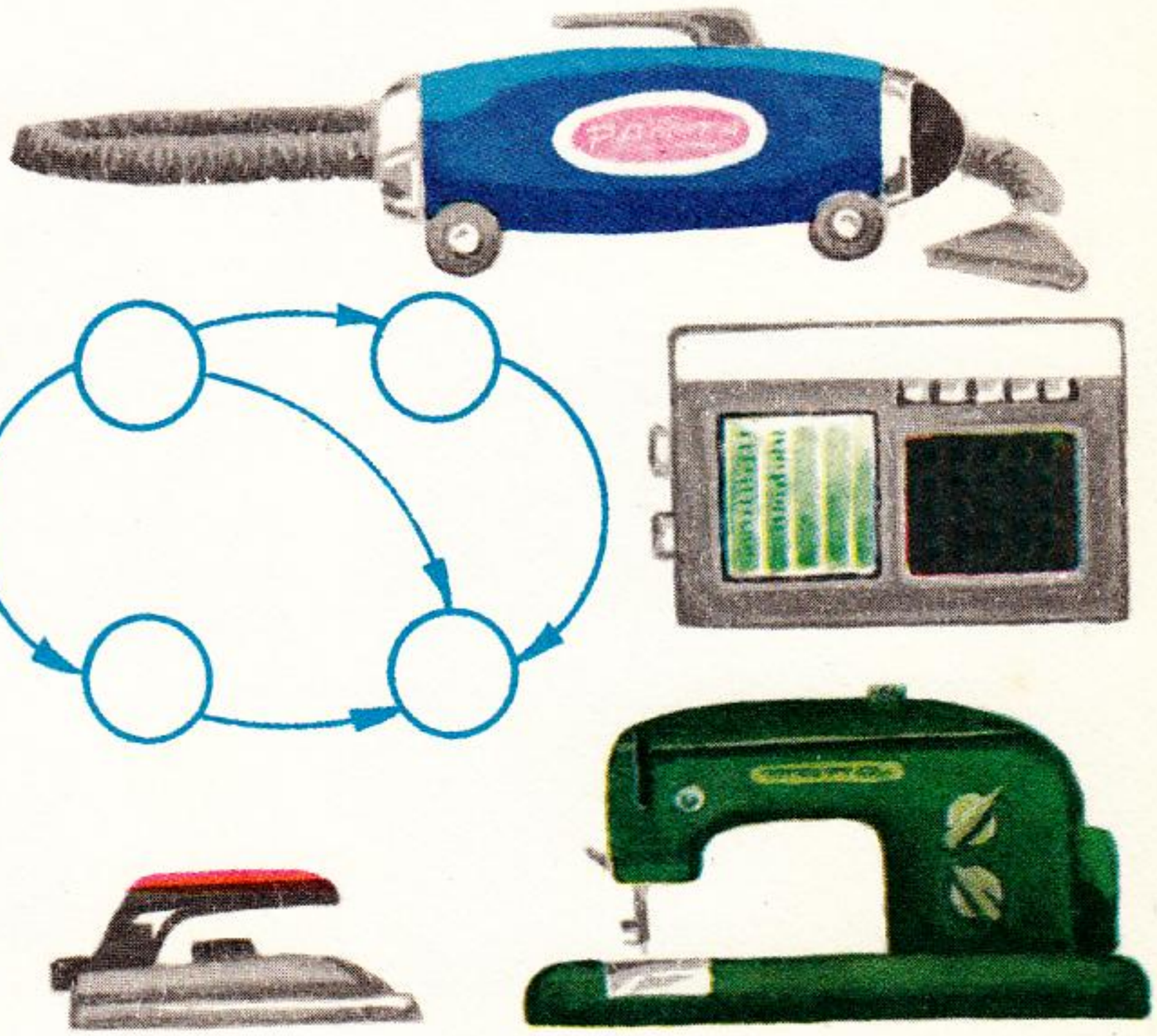


EXERCISES EXERCISES

18. Ira has visited Lyuba. And Sveta has also visited Lyuba. But Ira and Sveta haven't visited each other. Ira is older than Lyuba and Sveta who are of the same age. These relationships between the girls are shown in the drawing with different-coloured arrows. The red arrow says, "she has visited me". The blue arrow says, "she is older than me." Look at the drawing and say which of the triangles stands for Ira, which for Lyuba and which for Sveta?



19. The sewing-machine weighs 12 pounds, the radio weighs 9 pounds, the vacuum-cleaner also weighs 9 pounds, the coffee-grinder weighs 3 pounds and the iron weighs 2 pounds. In the drawing they are all shown as circles. Each arrow says, "this is heavier." Look at the drawing. Which circle stands for the iron? What do the other circles stand for? Can you say what all the circles stand for? Why not?



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20. Here is a set of numbers.

1 2 3 4

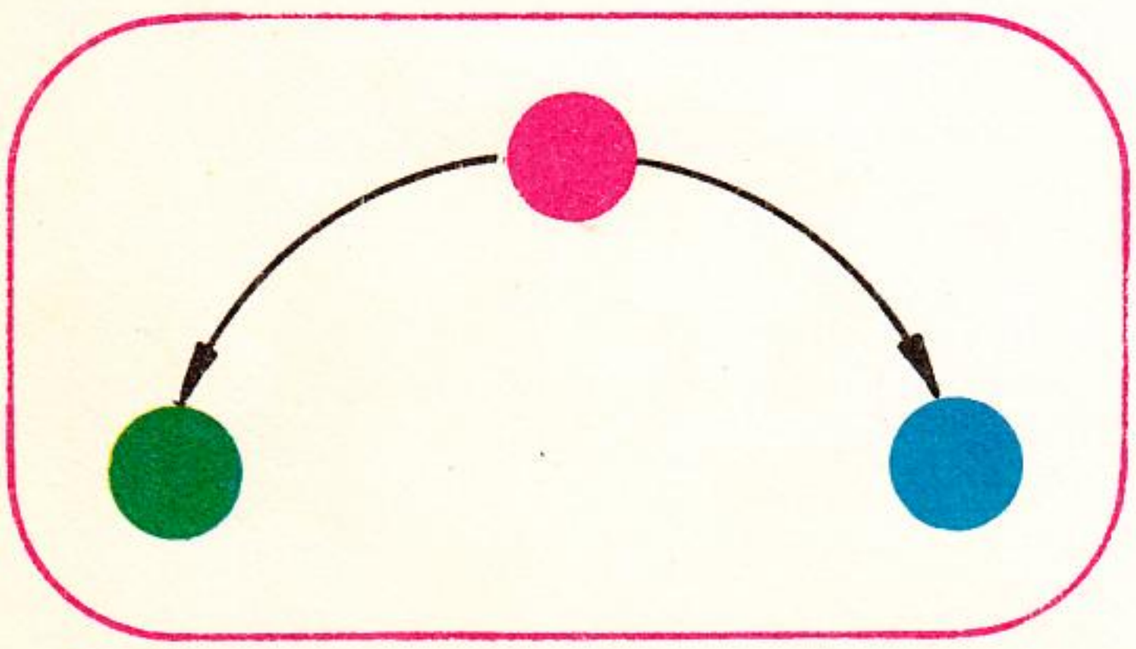
The numbers in it go from 1 to 4. This set is shown as a red circle.
Here is another set of numbers.

1 3

It is made up of two numbers, 1 and 3. This set is shown as a green circle. And here is one more set of numbers. There is only one number

4

in it, 4. It is shown as a blue circle. Let the arrow say, "this is the part that has fewer numbers in it than I have". Then the relationships between the sets, shown as circles, can be seen in the drawing below.



Now let us take these sets of numbers and give each one a different sign so that you can tell which it is.

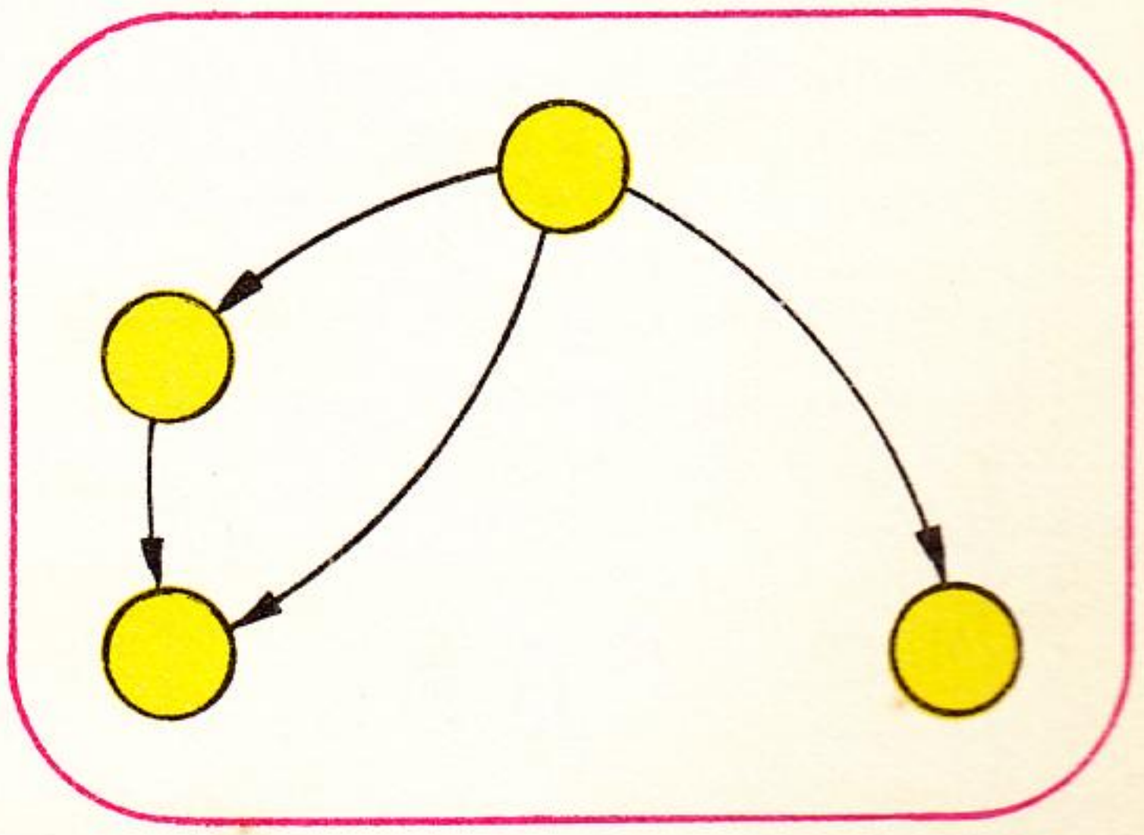
5 6 7 8

5 6 8

6 8

5 7

Let the arrow say once again, "this is the part that has fewer numbers in it than I have". Look at the drawing. It shows the relationships between the four sets. But the signs haven't been drawn properly. How would you do them correctly?



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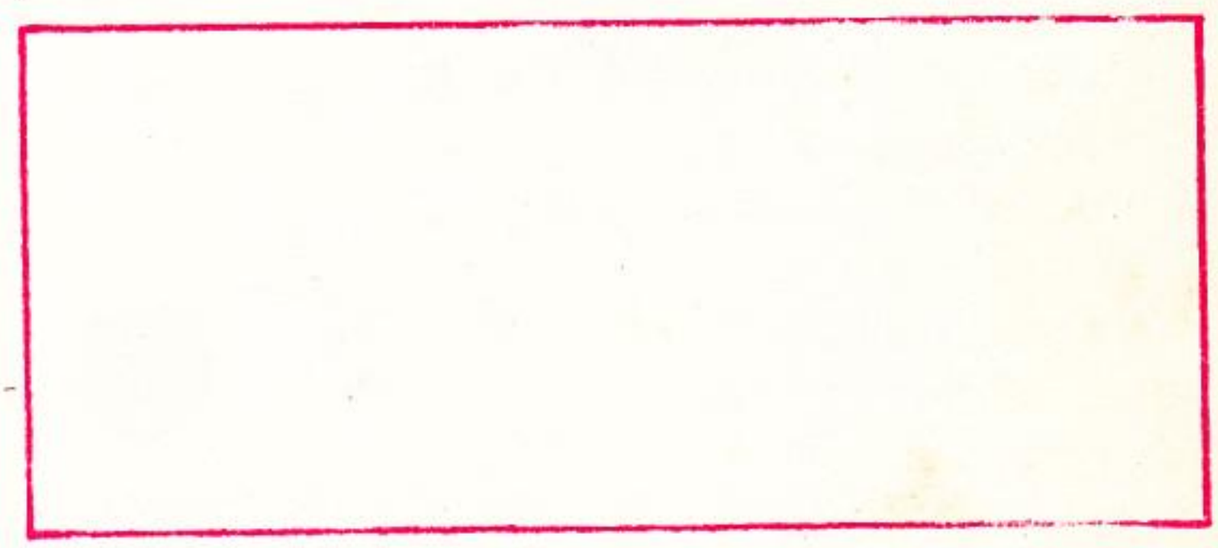
21. Here is a one-centimetre segment. Check it against your ruler.



Now measure this segment.



Now measure the length and width of this rectangle.



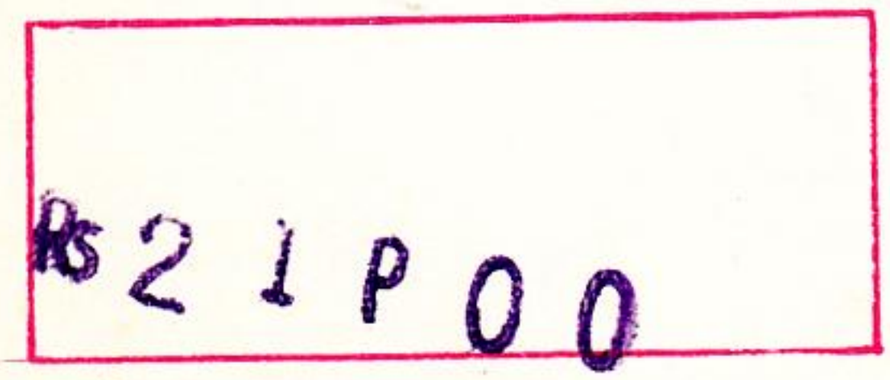
22. Here is another segment. It consists of two parts.

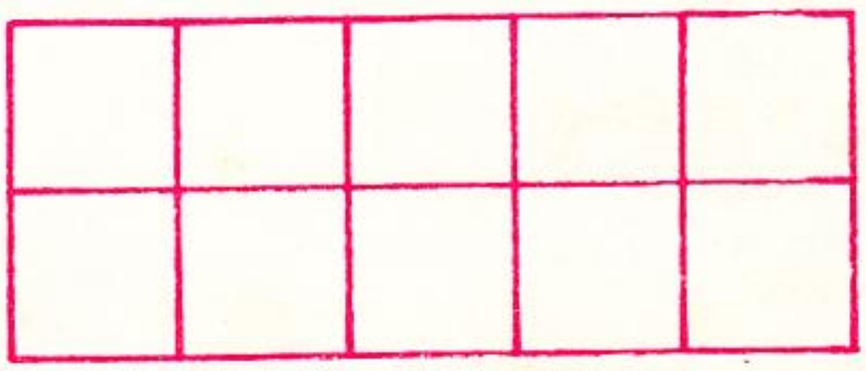


Measure the length of the red part, then the length of the blue part. Now work out the length of the whole segment. How will you do this? Will you have to measure it again? Here is another segment. It also has two parts. Measure the length of the whole segment, and then the length of the yellow part. Now work out how long the green part is. How will you do this? Will you have to measure again?



23. Measure the length and width of this rectangle. Write down the measurements, 5 and 2. Draw a similar rectangle in your notebook. Now divide it into equal squares, as shown in the drawing. Now you have ten little squares. But you need





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not have actually drawn the squares. It would have been enough to imagine them, and see that 5 should be multiplied by 2 (two "floors" with 5 "rooms" each), or 2 multiplied by 5 (5 "floors" with 2 "rooms" each). Now imagine that the rooms are 4 yards long and 3 yards wide. If you draw segments to form squares with sides 1 yard long, how many squares will there be?

24. What is the name of the ninth month of the year? The tenth month? The eleventh and twelfth? Give the names of all the months of the year in the right order, like this: the first month is January the second month is February and so on, on your own.

IS IT DIFFICULT TO LEARN MATHS?

Petya enjoyed learning maths. He counted, drew pictures and did all sorts of sums and found it as much fun as riding his bicycle, swimming, running and playing in the courtyard with his friends. And sometimes mathematics even helped him at play. A group of boys, Petya, Seryozha, Dima, Seva and Kostya once met in the playground and started arguing about who should be first to go on the swings, and with whom. Everyone wanted to go first and they simply couldn't agree.

"What's all the argument about?" Petya wanted to know. "We can sort it all out easily. You just work out every possible pair we can make up and in that way everyone has a go with everyone else, and nobody will feel left out."

Sveta, who was playing in the sandpit nearby, heard him. "Shall I give each pair a ticket?" she asked. The boys agreed. Seryozha picked up five fallen leaves and handed them to her. "Here. These'll do," he said.

"I don't think five'll be enough," said Petya.

"Why not? There are five of us."

"Yes. But there'll be more than five pairs. Just a minute, I'll count." He thought for a while, then picked up a twig and started to write something in the sand. The other boys watched with interest.

"There'll be ten pairs!" Petya exclaimed. "So we'll need ten tickets. Here you are, Sveta. Here are five more leaves."

"How did you manage to count so quickly?" Seryozha asked enviously.

"You have to know maths. Then it's not difficult."

"What? Do you know maths?"

"I've been doing it for quite a while now with my mum and dad," Petya explained. "Come over to our place and I'll show you my notebooks."

The boys started to take turns on the swings. They kept a record of who went with whom and saw that there really were ten different pairs.

When Petya brought Seryozha home he told him all about his maths and showed him his notebooks. Seryozha looked at them for some time. "It looks very hard," he said. "I wouldn't be able to understand any of it."

Just then Daddy came in. "You're quite wrong," he said. "Anyone can start maths long before school. It's really interesting and it's also often very useful. Of course, you have to do quite a bit of work. But then, the more you learn, the more you can do."

"I'm going to ask my mum and dad to do maths with me," said Seryozha, cheering up.

"Shall we go on with our maths, Daddy?" Petya asked.

"We will indeed," said Daddy.

REQUEST TO READERS

Raduga Publishers would be glad to have your opinion of this book, its translation and design and any suggestions you may have for future publications.

Please send all your comments to 17, Zubovsky Boulevard, Moscow, USSR.



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2 × 2 = 4

"Shall we go
on with
our maths,
Daddy?"
Petya asked.
"We will
indeed."



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